

A HITCHCOCK PUBLICATION

assembly & fastener

ENGINEERING

JULY • 1960



Producing the B-70 Space Age Bomber

Also in this Issue:

Hydrogen Embrittlement In Fasteners

Silver Brazing Stainless Steel

Modular Design in Assembly Equipment



this man
had a
fastener
problem...



and here's how Pheoll solved it

It's no picnic . . . this rising cost of labor and material . . . especially to a cost-control engineer.

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ENGINEERING

July, 1960

Volume 3, Number 7

FEATURES

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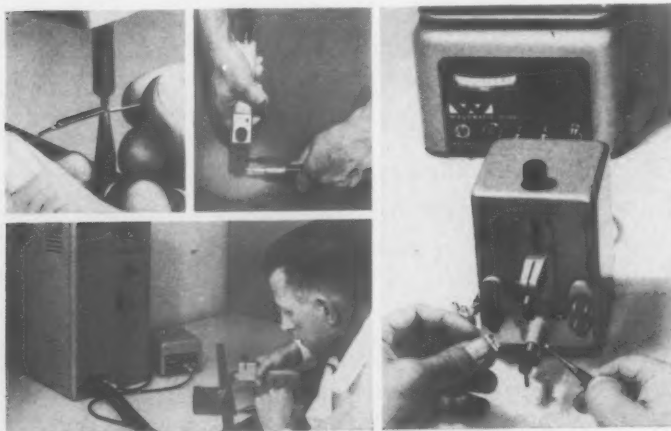
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Letters to the Editor

Strength of Screw Threads

In your June issue is an article entitled "The Strength of Screw Threads." Would you send us four reprints for distribution in our engineering department?

Henry W. Meyer
Engineering Department
Gardner-Denver Company
Quincy, Illinois

• Reprints of this article will soon be available to all interested readers.

Susie's "Autobiography"

Please send me Susie, or, if she is not available, send her autobiography entitled "Shop Tips on Blind Riveting."

R. O. Clark
Editor, Process Manual
Aerojet-General Corporation
Azusa, California

• While a few copies of her "autobiography" are still available, we are sorry to report that Susie is only an artist's dream girl.

Torque Considerations

I missed your article on "Torque Considerations in Design" which was published in your January issue. If possible I would appreciate receiving tearsheets.

John D. Budrean
R & D Engineer
Verson Allsteel Press Co.
Chicago, Illinois

• Our supply of tear sheets was exhausted long ago, but we now have reprints available to interested readers.

Spike Welding

In an article in the March edition, mention was made of a new type welder called a "spike welder." It would be appreciated if you would send us further information.

Lou Moses, Supervisor
Weld Engineering Section
Mfg. Research & Processes
Republic Aviation Corporation
Farmingdale, New York

Would you send us more information regarding the welding machine mentioned on page 20 of your March issue.

N. J. Hebert
Administrative Engineer
Architectural Products Div.
The Kawneer Company
Niles, Michigan

• Further information is available from the Weldex Division, Metal Craft Company, 3300 Doris St., Detroit, Michigan.

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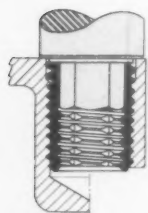


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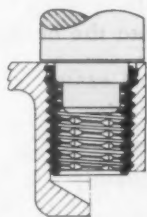
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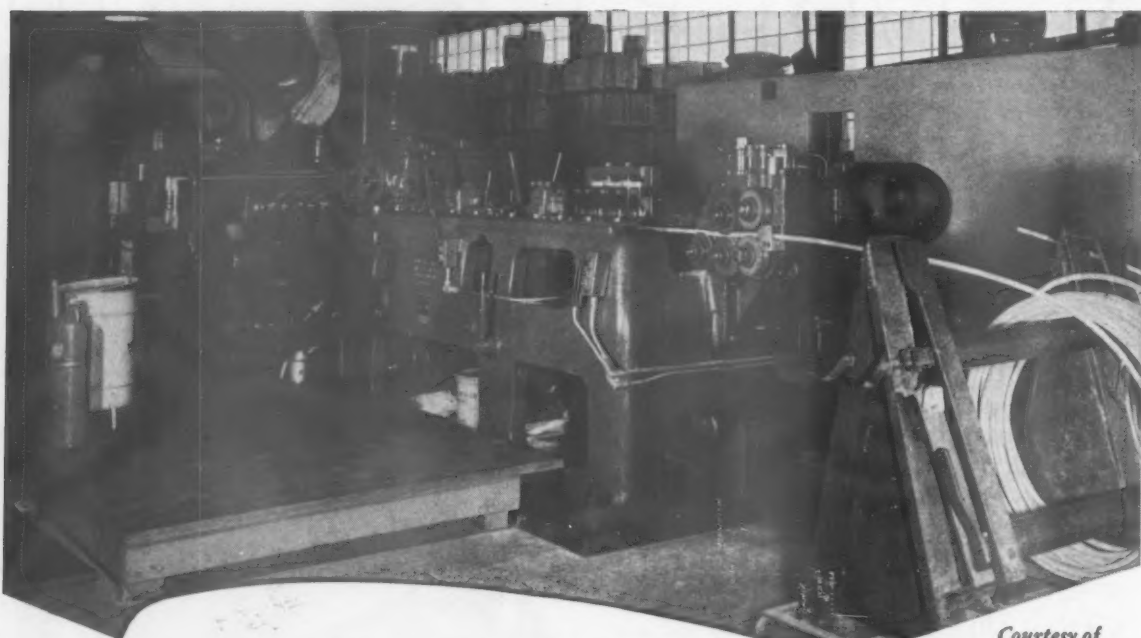
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Write for Bulletin 111-A

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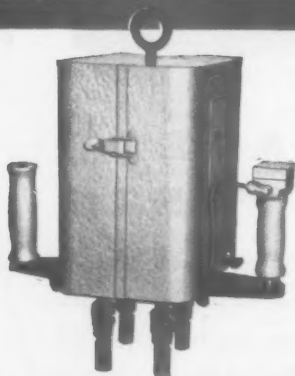
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1

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This versatile Gardner-Denver multiple nut setter adjusts to the bolt pattern of two different models. One operation tightens all nuts simultaneously—each to predetermined torque. Standard handles and spindles assembled on mounting plate designed to handle any bolt pattern. Bulletin 16-101.



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Here's the Gardner-Denver 16C-5 angle nut setter that not only reaches around corners and into channels, but accurately senses specified torque. It's equipped with an angle version of the popular "Safe-Torque"* clutch. Powerful, muffled air motor.

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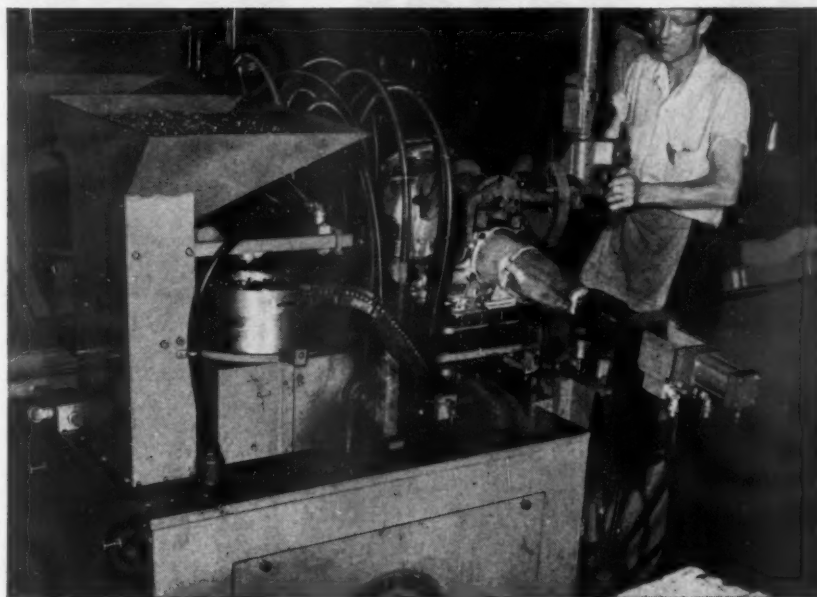


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Here's your solution to large nuts in awkward places. It handles high torque to 150 ft.-lb., yet, this Gardner-Denver 17B-515 ratchet wrench has the versatility and durability of the famous Gardner-Denver ratchet wrenches in smaller sizes. Bulletin 17-51.

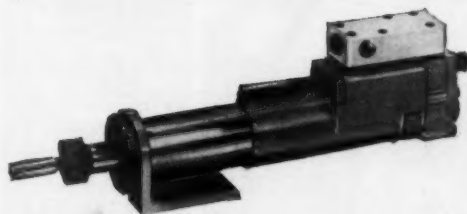
FORD SPEEDS PRODUCTION

of automatic transmissions with three pneumatic production machines—specially designed by Gardner-Denver. These units automatically and simultaneously feed cap screws, hold and support the transmission, and set the screws on the oil pan assembly in a fraction of manual time. This is typical of the many tough problems Gardner-Denver solves for production men—in drilling and tapping, as well as fastening.



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To solve small-capacity fastening applications, Gardner-Denver introduces a new line of No. 1 motor reversible tools. Screw drivers and nut setters are available with suction pickup feature, plus a variety of clutches and angle attachments. Write for information.



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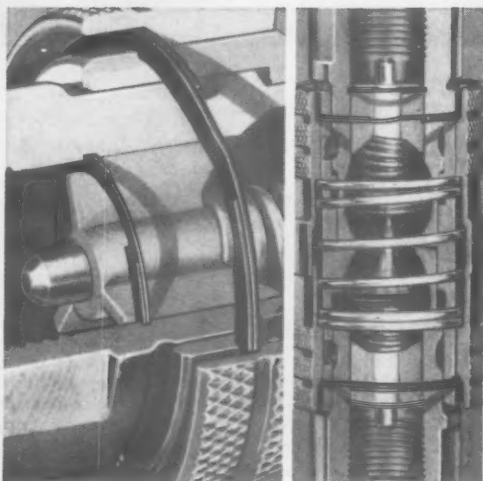
New Gardner-Denver Airfeeddrills® with air-check feed control make it easy and inexpensive to automate almost any drilling setup. Mount them as a drilling unit of 2, 20 or more spindles for automatic hole processing. Use one as a stationary or portable drill, too. Bulletin 92-121.



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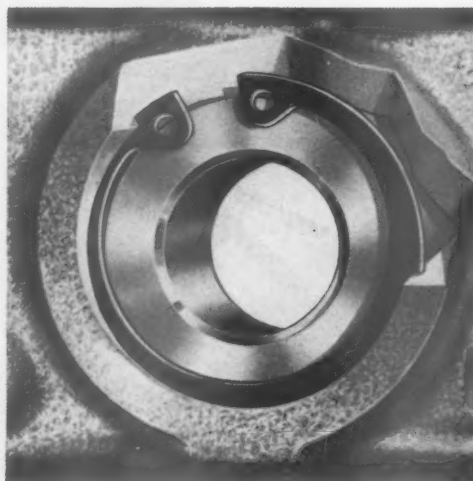
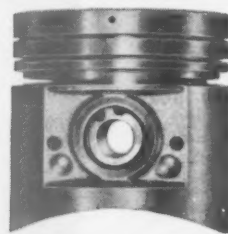


SpirOlox

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This unique Ramco design, full-circle 360 degree retaining ring opens up unlimited possibilities for improved design and economies in thousands of new or present products. Check these outstanding features:

- ✓ Uniform wall allows installation with minimum clearance.
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- ✓ Single or multi-turn designs available.
- ✓ Always uniform in quality.
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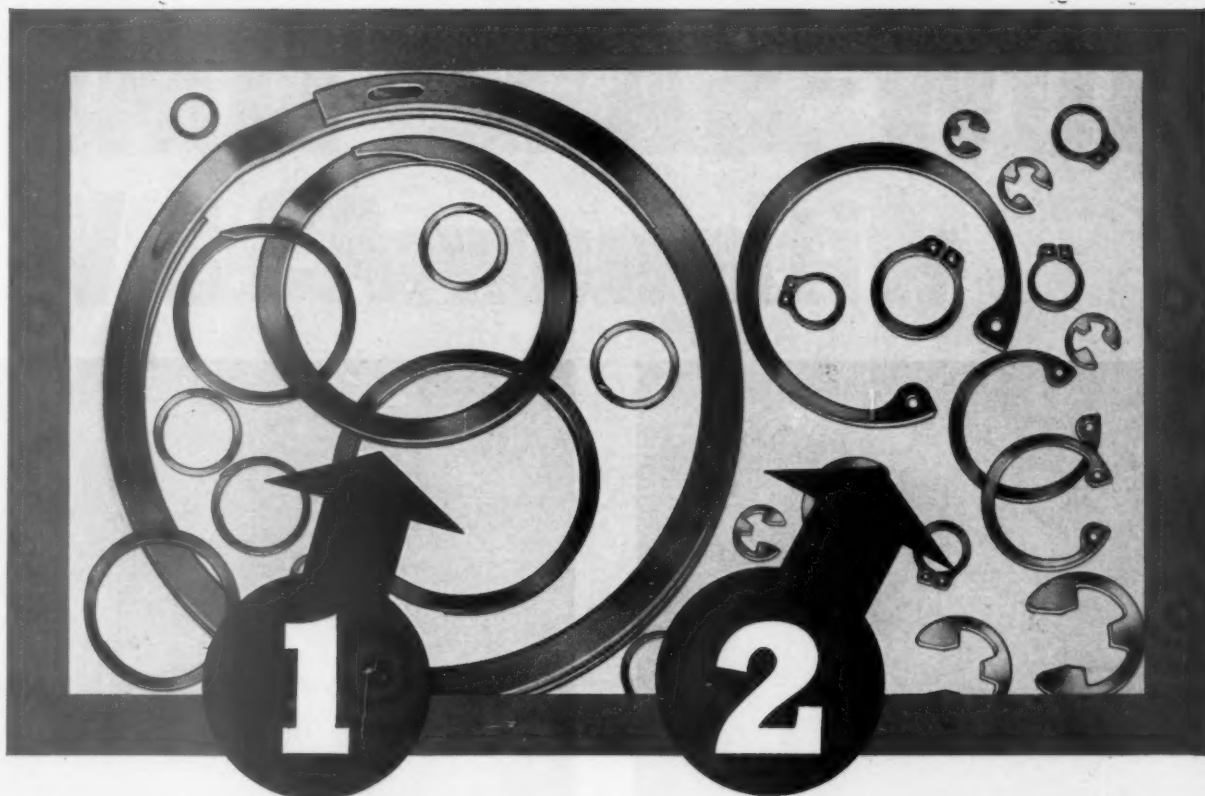


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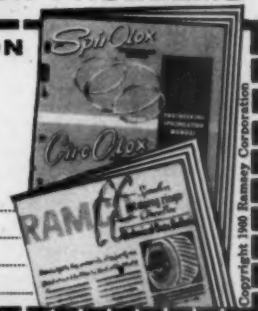
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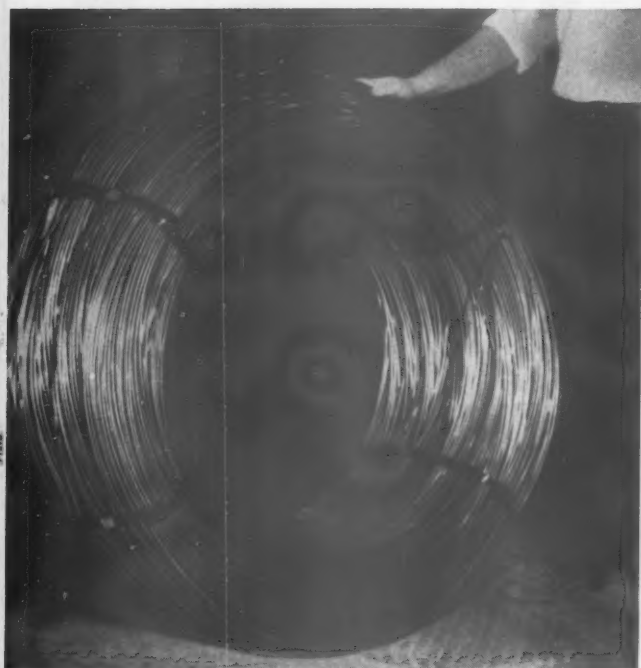
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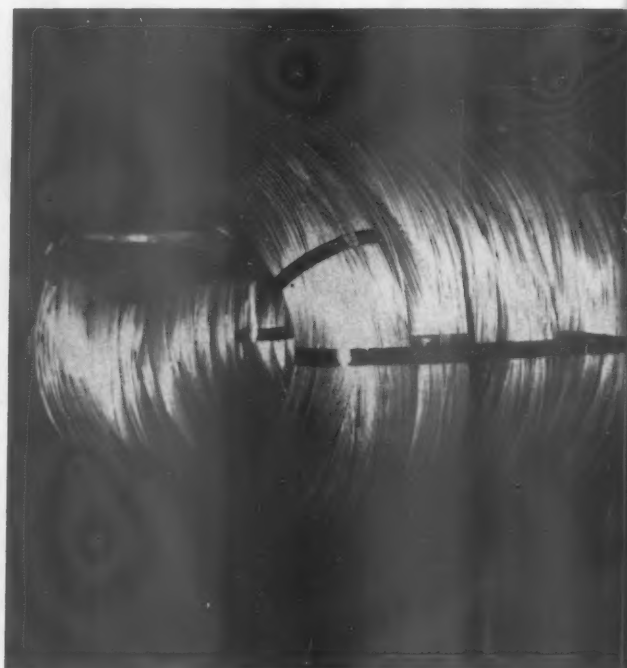
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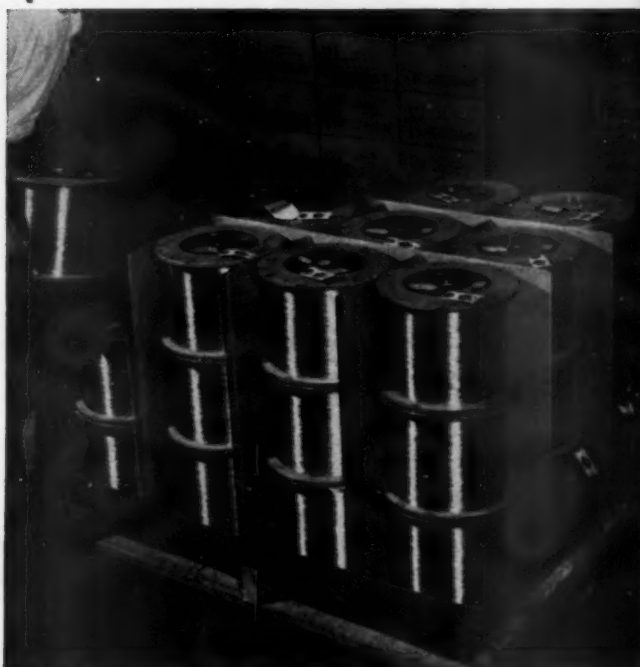
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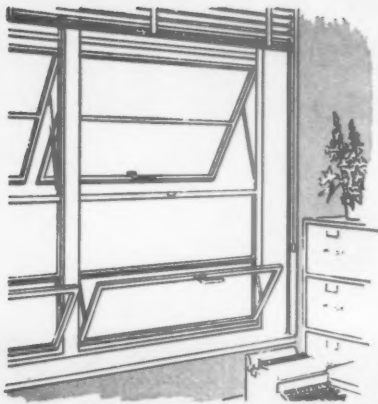
are easy to handle and stack, take up little space!

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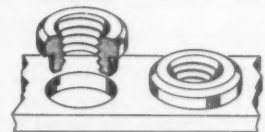
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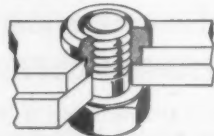
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Assembly and Fastener Engineering



Plug Nut is easily inserted with hand punch or small press. Displaced hole material flows into knurl and annular groove, to clinch nut securely in place. Note that Plug Nut does not project through material.



Plug Nut's low profile head is a real advantage where clearance is tight.

THE EDITOR'S VIEW

JULY, 1960, VOL. 3, NO. 7

WE RUSH TOO MUCH TO ENJOY OUR DESTINATION



A bane of this bustling age is that everyone seems to have a compulsion to rush to and from any destination—whether it be to the corner store or to a distant city.

We can't really enjoy being at our destination because of concern for making the return trip as soon as possible. It has reached the point where, even before we leave, we make sure our cohorts know the exact time of our return. No longer can we spare the time to browse in the local store, or explore points of interest in far away places.

And apparently this is as true of design engineers as of other mortals, although if anyone in this hectic industrial world should be relatively unfettered as to time, it should be these engineers.

But such is not the case, for those who attended the recent Design Engineering Show at the Coliseum in New York City seemed as bound by the limitations of time as anyone else. What a pity they couldn't have added a few more hours to their stay so as to include a visit to some of the city's outstanding architectural structures, such as the United Nations Building, or the Guggenheim Museum which was opened a few months ago.

The latter is just a short stroll across Central Park from the Coliseum. We visited this last great work of Frank Lloyd Wright, and our only company was several hundred school children and their teachers. Here would have been a wonderful op-

portunity for designers from industry to see what can be done with just commonplace material—concrete and steel in this instance.

This new museum was designed for the explicit purpose of exhibiting contemporary art under the most favorable of indoor lighting conditions. It is a tribute to the genius of Mr. Wright that this concept also resulted in a structure which is a piece of art in itself.

We personally were impressed with the ethereal nature of this concrete building. And to enjoy it fully, one must take an elevator to what would be the sixth floor, and stroll down the gently sloping ramp which winds a circular route down around the inside of the building. Along the way you can view paintings and drawings "suspended in light" against the circular wall.

The entire center of the building is open from the domed roof, to the floor, providing a view uncluttered by structural supports. The self-supporting ramp is an integral part of the wall.

Standing at the edge of the ramp, at any point along its circular route, one can look into this open expanse and sense a lightness and airiness which is uncommon to totally enclosed buildings. Without concern for the art on exhibit, this view alone is worth a visit to the Guggenheim Museum. It should be a "must" for every design engineer, as well as every structural engineer, who has an opportunity to visit New York City.

Oratt E. Hewitt

Managing Editor

FAST, HAMMER-DRIVEN RIVET ECONOMICAL FOR BLIND AND OPEN APPLICATIONS

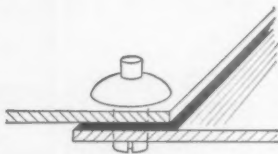


Fig. 1 Inserted in hole, Southco Rivets are quickly set by driving pin with hammer. No special tools are required. Bucking is not necessary.

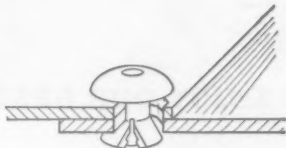


Fig. 2 Expanded prongs force sheets or parts together, hold them tightly in compression. No metal is removed, no grinding or finishing is required.

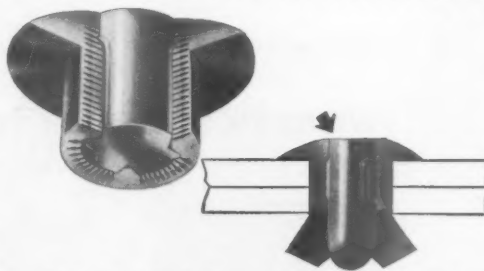


Fig. 3 Pin is locked securely into rivet by displaced metal filling unique grooves. Compression forces are utilized for greater strength.

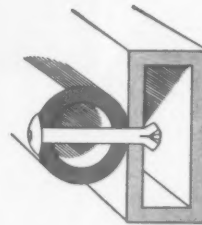
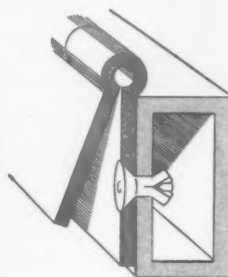
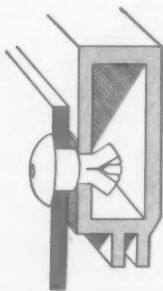


Fig. 4 Ideally suited for "blind" applications, Southco Rivets are worked by one man from one side only and require minimum space inside closed area. They eliminate costly bucking

arrangement or time-consuming finishing. Supplied as a unit, they require no job time for assembly or fitting.

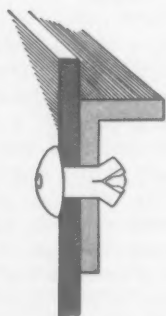


Fig. 5 Access or open fastening utilizes the simplicity, speed and vibration-resistance of Southco Rivets.

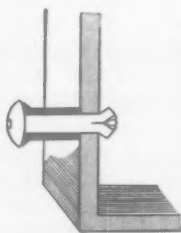


Fig. 6 Ferrules are used as spacers for numerous applications. Here the Southco Rivet forms a drawer pull in conjunction with a flanged tube.



Fig. 7 Increased head size distributes holding pressure over larger area, permits higher loading on wood, plastics and similar materials.



Fig. 8 A blind head can be formed inside the wood. This application is particularly useful when it is desirable to have one surface of the wood unmarred.

FREE RIVET FOLDER



Send for your free copy of "Southco Drive Rivets" Folder. Gives complete information on the application, installation, and specifications of aluminum and steel Drive Rivets.

Write on your letterhead to Southco Division, South Chester Corporation, 257 Industrial Highway, Lester, Pennsylvania.



BLIND RIVETS

1/4 TURN FASTENERS

ADJ. PAWL FASTENERS

DOOR LATCHES

RETAINING SPRINGS

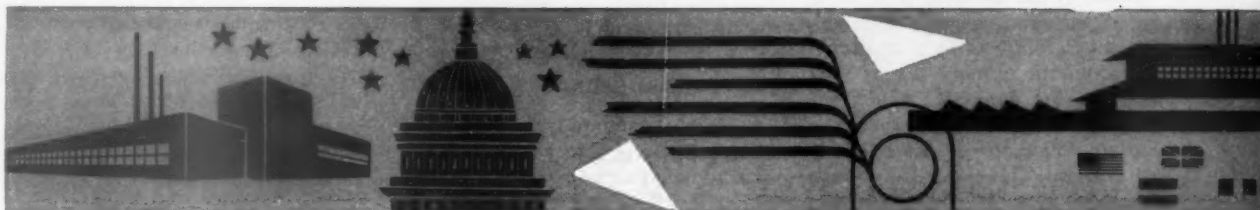
ANCHOR NUTS

SOUTHCO FASTENERS
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LION

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Assembly and Fastener Engineering

The State of Business



WHO ARE "THE UNEMPLOYED"?

At mid-December 1959, unemployment in the nation was estimated at 3.6 million. This was 90,000 less than in November, reflecting primarily the recall of workers laid off as a result of the steel strike.

Usually, unemployment rises seasonally about 100,000 between these months. Although unemployment at mid-December, seasonally adjusted, had declined to 5.2% of the labor force and was well below the 1957-58 recession high of 7.6%, it was still somewhat higher than in the summer of 1957, which marked the peak of the preceding boom. This failure to drop back to the previous low also occurred following the 1953-54 recession.

This reflects the considerable movement into and out of a growing labor force. Much of this new labor consists of married women, older persons and the very young, the first to be affected by seasonal factors and shifts in the economic climate. The irreducible minimum of unemployed may total as much as 1.5 million, or 2% of the labor force.

Information on unemployment is compiled each month by the Bureau of the Census. Statistical projections are based on a monthly sample of civilians 14 years and over. Unemployed include those who

did not work all during the survey week and were looking for work.

Those awaiting the results of efforts to find jobs within the 60 days preceding the survey week are regarded as looking for work. Also included are those who (a) were waiting to be recalled to a job from which they had been laid off, (b) were waiting to report to a new job scheduled to start within the following 30-day period, or (c) would have been looking for work had they not been temporarily ill or believed that no work was available in the community of the type sought. Strikers are considered employed.

Looking at November 1959, for instance, a little more than half of the unemployed had been out of work for less than five weeks. An additional 28% had been idle for 5 to 14 weeks. Both of these groups probably included some workers who had not yet been recalled to jobs from which they had been laid off as a result of the steel strike. Twenty-one per cent of the total had been out of work for 15 weeks or more—since before the strike. Twelve per cent had been out of work for 27 weeks or longer.

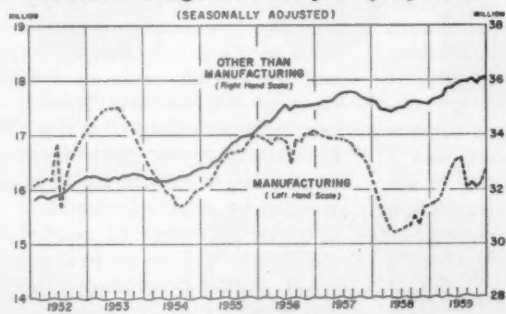
What characterizes the group which has been unemployed consistently for a long time? One outstanding characteristic: the group includes a high proportion of unskilled workers. Those with less skill tend to be laid off earlier and to remain out of work longer. Among the major occupational groups, extended unemployment in November was most common for laborers (excluding farmers and miners.)

Expressed as a percentage of labor force, the rate of unemployment for non-white workers was 2½ times the rate for white workers in November. Differences were even greater for men, where the rate for the non-white was 3 times that for the white.

Age is another important factor in long-duration unemployment. The incidence of persistent unemployment is greatest for men and women under 24 and for men over 65. The difficulty encountered by

continued

Nonfarm Wage & Salary Employment



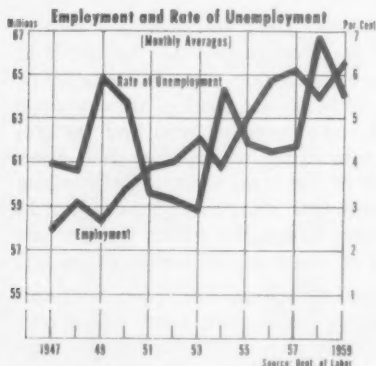
Sources: Bureau of Labor Statistics; Most recent month plotted - Dec.
Prepared by THE NORTHERN TRUST COMPANY - Chicago

State of Business, continued

many older workers in finding a job is well known. Less well recognized is the difficulty of the young worker—often inexperienced, unskilled and with limited education—to gain a foothold promptly.

Some of the movement into and out of the labor force is seasonal, but much of it reflects shifts in the economic climate. From 1957 to 1959, for example, which includes the period of recession, the civilian labor force increased by 1.4 million. The armed forces declined by roughly 200,000 so that the total labor force went up only 1.2 million. This was less than half as much as the increase in population 14 years old and over.

From 1954 to 1957, on the other hand, a period in which economic activity rose strongly, the labor force increased 2.6 million, or slightly more than the rise in population of working age. Behind the rise in total labor force was the increase of 3.1 million in the civilian sector and a drop of one-half million in the armed forces.



Although employment in 1959 equaled a record high, the rate of unemployment remained above the postwar average.

This 1954-56 experience illustrates how the labor force can expand—largely through married women and older people seeking work—in a tight labor market. The number employed usually can increase far more than would be indicated by the number unemployed. There is some “frictional” unemployment, which results from high voluntary quit rates and seasonality in operations.

Unemployment is more common in some industries, such as mining. Important here is the secular decline in coal mining as a result of mechanization and competition from gas and oil.

In manufacturing, textile workers have experienced long periods of idleness. Persistent unemployment was relatively high among construction workers during the first half of 1959.

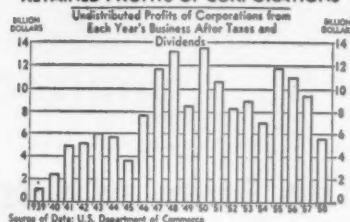
Just as unemployment is pronounced in certain age, color and occupational groups, continuing high levels of unemployment are more common in some areas than in others. The Bureau of Employment Security, in a July 1959 study, classified 17 major areas and 53 smaller centers as areas with substantial labor surplus. Unemployment rates here were at least 50% above the national average during four of the five preceding years.

Many of these areas are located in the northeastern states. New England textile centers have had prolonged unemployment as a result of declining markets for wool and cotton textiles, as well as the relocation of some mills. Numerous coal mining centers appeared on the list. Pennsylvania and West Virginia have 18 areas so classified. Pockets of persistent unemployment are found also in the mining fields of Kentucky and southern Illinois. Many of these communities are not within commuting distance of cities where jobs are available. The population has not adjusted in these problem areas.

In the midwest, the largest of these areas is Detroit, where employment has been adversely affected by decentralization of auto manufacturing facilities, automation, declines in the amount of defense work and shifting consumer preferences among various autos. Note that Detroit was a “boom town” during much of the post-war period and attracted a large labor force from outside the area. Since 1956 it has had a substantial labor surplus.

Adapted from a report by the Federal Reserve Bank of Chicago.

RETAINED PROFITS OF CORPORATIONS



Industry Briefs

Commerce Secretary Mueller has promised that “no hardship will be worked on American industry” in the 28-nation tariff negotiations in September. Lower tariffs will be considered for 2200 imports to the U.S. . . . Rumor continues that Chrysler (resources) and American Motors (management) will merge. . . . Russia is wooing Ghana in hopes of ousting Kaiser from its \$173 million Volta River hydroelectric project contract. . . . 20 top economists predict an 8 to 12 month recession beginning in mid-1961 led by reduced industry and consumer “big ticket” spending and a government surplus. . . . Aluminum’s new product uses are rising this year, up 30% in autos to 182,000 tons, 300% in cans, 18% in construction and equipment. Industry will produce 2.15 million tons. . . . Florida’s largest juice distributor, Tropicana, (50% of the market), is sitting out a 30-day suspension for spiking orange concentrate with cane sugar. . . . Steel production may puncture 60% of capacity during the July slump. . . . Dealers still have to clean up over 1 million ’60 cars stocked. Profit margins on new cars jumped from \$60 to \$70 on the average this spring. But used car prices are dropping. . . . Mack Trucks joined the list of manufacturers with captive installment finance subsidiaries. . . . GM is increasing production capacity at three overseas subsidiaries: Vauxhall by 100,000 units to 350,000; Opel to 420,000; and Holden in Australia to 125,000. . . . The FTC is intensifying its surveillance of advertising to end the use of bogus guarantees and warranties. . . . Growing replacement market in appliances was shown in a survey which pegged percentage of major appliances being 10 years or older still in use as over 35%.

PIONEER

STEEL BALL COMPANY, INC.
MILL STREET, UNIONVILLE, CONNECTICUT, U.S.A.



KEYSTONE WIRE *rewards ball manufacturer*

Rolling from the heading dies of Pioneer Steel Ball Company, Inc. of Unionville, Connecticut, come steel bearing balls made from wire for uses ranging from missiles to roller skates, to bag fasteners, to balls for burnishing.

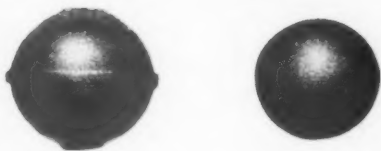
Pioneer bearing balls must conform to approved engineering standards with sphericity often specified as close as .00001". To get maximum quality, Pioneer makes a point of knowing their basic material—wire!

President N. Martinelli says, "This combination of right chemical analysis with special drawing and thermal treatment results in proper end quality. You can't have one without the other. That's why we like Keystone "XL" Ball Bearing Wire. It has consistent *flowability* and hardenability properties."

Keystone "XL" Ball Quality Wire conforms repeatedly to analysis of interior hardening properties and exterior workability for upset actions. Care in drawing the wire assures consistent characteristics—uniform size, extremely fine grain structure, *flowability* that results in long die life and high quality bearing balls.

Perhaps your wire problem can be solved the Keystone way. Phone or write today for consultation with a Keystone representative regarding application of "XL" Heading Wire to your product.

Keystone Steel & Wire Company, Peoria 7, Illinois



HEADED BEARING BALL before (on left) and after flash grinding. Uniform wire characteristics are required for close tolerances. *flowability* is the secret.



KEYSTONE

WIRE FOR INDUSTRY

check these cost-cutting NEW IDEAS from SETKO

then check the coupon below for full information and free test samples

IDEA #1 "NU-CUP® POINT GRIPS THINWALL-TUBING BETTER THAN ALL OTHERS TESTED!"



42% sharper angle on point cuts deep into the metal in a circular manner!

CONVENTIONAL

An independent manufacturer tested all types of points to find the one that would hold best...and perform most dependably. He chose NU-CUP. Could you use this idea? Check No. 1. (Name of Mfr. on request.)

Set Screw & Mfg. Co.

IDEA #2 THIS COST-CUTTER TAKES 50% MORE TORQUE BECAUSE OF SLABBED HEAD CONSTRUCTION!



Costs less than comparable hexagon head set screws.

If you are having trouble with stripped heads or insufficient holding power, chances are the Setko Slabbed Head Set Screws are just the idea you need...Available in all points and metals. Check No. 2!

Set Screw & Mfg. Co.

IDEA #3 IS VIBRATION CAUSING LOOSE SET SCREWS ON YOUR PRODUCTS?... ELIMINATE THIS PROBLEM WITH ZIP-GRIP®!



Slight variation of thread causes locking action on mating surface!

Proven as an outstanding principle in many products, Zip-Grip has found particular acceptance wherever the stress of movement or vibration occur. Makes an outstanding adjusting screw... Can be reapplied many times... Got an idea? Check No. 3.

Set Screw & Mfg. Co.

IDEA #4 TINY SCREWS DO BIG HOLDING JOB... THEY'RE CALLED "MINI-MITE"



You'll find them perfectly-produced counterparts to their big brothers!

If miniaturization is one of the fields that you're interested in, then you'll see many good ideas in the perfectly-produced, money saving selection of Mini-Mites... Why pay for Specials when these can keep your costs at a minimum... Get the idea? Check No. 4.

Set Screw & Mfg. Co.

IDEA #5 NEW SELF-LOCKING SET SCREW SELECTOR CHART LISTS OVER 1,001 COMBINATIONS.

Helps you determine available combinations best for your particular application!

Here is another Setko first... A complete listing of locking actions, points, metals, drives, etc., including suggested applications of the complete line of Setko self-locking screws... It's jam packed with ideas for you! Check No. 5.



Set Screw & Mfg. Co.

IDEA #6 "SETKO HOPPER FEEDER SAVED US \$42,000 IN FIRST YEAR."



Here's the first truly Automated method of hopper feeding Headless Set Screws.

Unique Setko Hopper Feeder design orients headless Set Screws then feeds them to a driving device... Savings like the one shown above are but one of the advantages (name of mfr. on request)... Product quality is consistent, etc. This cost-cutting idea is one you can't miss! Check No. 6.

Set Screw & Mfg. Co.

IDEA #7 NOW YOU CAN GET COLD FORGED "PERFECT HOLE" CAP SCREWS IN THE NEW '60 SERIES... and in STAINLESS STEEL, TOO!



If you're a user of Cap Screws you'll want to examine these yourself... We know you'll get our idea of trying to produce a perfect product consistently... We're sure you'll appreciate their performance once you've tried them... Would you like test samples? We'll be glad to send them! Check No. 7 and indicate sizes, etc.

Set Screw & Mfg. Co.

IDEA #8 THERE'S A BARREL-FULL OF IDEAS IN THE NEW 28-PAGE SETKO CATALOG #23.



The complete line of cost-cutting SETKO Socket Screw Products is at your fingertips.

You'll want this compact catalog for your personal use... And you'll particularly like the easy to read manner in which it has been prepared. Want a copy? Check No. 8.

Set Screw & Mfg. Co.

Set Screw & Mfg. Co.

705 MAIN STREET, BARTLETT, ILLINOIS

Please send me Idea information on items checked below. (If FREE samples are wanted of any of these products, send your specifications).

<input type="checkbox"/> 1. Nu-Cup	<input type="checkbox"/> 3. Self-Locking Selector Chart
<input type="checkbox"/> 2. Slabbed Head	<input type="checkbox"/> 6. Hopper Feeder
<input type="checkbox"/> 3. Zip-Grip	<input type="checkbox"/> 7. Cap Screw
<input type="checkbox"/> 4. Mini-Mite	<input type="checkbox"/> 8. Catalog

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Industry at Work



HOW DO ATOMS MOVE IN LIQUIDS? G.E. MECHANICAL MODEL GIVES THE ANSWER

A mechanical model that demonstrates how atoms move in gases, liquids, and solids has been developed at the General Electric Research Laboratory. The new device, in which several hundred glass beads jostle each other on a vibrating platform, is helping GE researchers toward the solution of one of modern science's more important problems: how atoms move in liquids.

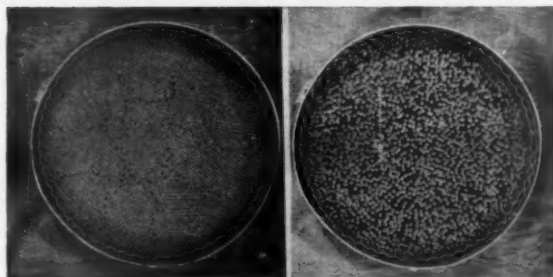
In the model, developed by David Turnbull and Robert Cormia, the glass beads are stand-ins for atoms. They are poured onto a round glass plate with a "fence" around the outside to keep them from rolling off. The plate, suspended from springs, is vibrated constantly by a motor mounted beneath it. The constant motion leads the beads to behave as atoms are believed to. This behavior, in the model, can then be photographed and studied.

"The properties of matter result from the interaction of many atoms," says Turnbull. "The long range objective of material science is to calculate these interactions and thereby predict the behavior of matter. However, precise calculations are extremely difficult and models can be of use by suggesting how such calculations may be simplified.

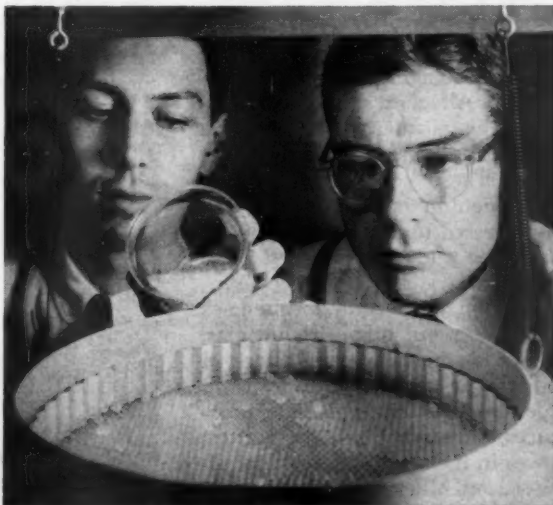
"Most models developed heretofore have had the shortcoming of not illustrating atomic motion. The unique feature of the present model is that the glass beads, representing atoms, are kept in the ceaseless random motion that atoms are believed to be in at all times. A remarkable number of the atomic interactions that are believed to occur in actual matter are illustrated by the model."

When only a few beads are poured onto the moving plate, the "atoms" behave as they do in a gas—moving rapidly over relatively long distances between collisions with other atoms, and arranging themselves in no particular pattern. As more beads are added, the atoms travel shorter and shorter distances, although they are still moving rapidly

continued



Hundreds of glass beads act out the role of atoms in liquids at the G.E. Research Laboratory. At right, the beads are loosely packed, and no pattern is visible. At left, a "solid" has formed, and the "grain boundaries" are visible.



A device which depicts the behavior of atoms was developed by David Turnbull (right) and Robert Cormia (left), who is ready to add more "atoms" to the surface of a "crystalline solid."

Industry at Work, continued

and are showing no pattern. This condition represents atomic behavior in a liquid. As the number of atoms continues to increase, they eventually "freeze" into a solid—becoming confined most of the time to a particular position, and forming a distinct pattern of several large areas separated by lines called "grain boundaries."

By means of movies taken of the model, many aspects of atomic

behavior are being studied, including the question of how the large areas of close-packed atoms enlarge themselves, pushing their grain boundaries out until neighboring small areas disappear. One drawback to the model is that the glass beads do not attract one another, as real atoms are supposed to do. Inside a solid material, however, such atomic attractions largely cancel each other out.

MINIATURE CORES HELP TRANSMIT MESSAGES FROM SPACE

Miniature filters, which are used to transmit and receive information from missiles, satellites and for other less exotic uses, are growing smaller and smaller.

The special core units in the filters have been reduced from 4¼ pounds to 1/3 of an ounce. Since there are 23 filters in a complete set or "package," the weight savings alone is tremendous.



Pictured is the smallest (.260" in diameter) and the largest (5.218" in diameter) of the powdered cores used in electronic equipment.

Arnold Engineering, a subsidiary of Allegheny Ludlum, supplies the powder core, which is the working member of the filter unit. These cores are made of molybdenum permalloy powder compressed under high pressures, annealed and then finished. The filter can transmit and receive information on certain frequencies and filters out other frequencies. By using certain type filters, a missile or satellite can transmit such information as altitude, pressures, radiation, direction, various gases in the stratosphere or ionosphere and other valuable information. Also, with the filter, changes in direction are made possible.

With such filters as Burnell & Co., Inc., makes, it is possible to

receive several messages over the same wire.

In 1947 the telemetering system, which uses 23 filters, and auxiliary equipment weighed a total of 207 pounds. This same type equipment with the sub-miniature and micro-miniature units would weigh 11.1 ounces.

While it was necessary to get compactness and lightweight into the systems, it was vitally necessary to get reliability. All Burnell filters are triple checked, and must withstand tests to have 100% reliability. The filter units are tested for 100-G's or 100 times the force of gravity and at 2000 cycles per second vibration test. In addition, they are tested for electrical loads. Each unit must withstand ultra high voltage loads far in excess of the load it might be expected to encounter in use.

The unit is hermetically sealed or encapsulated. It is then ready to meet the tests of space.



WORLD'S LONGEST permanent transport belt conveyor system has been installed in Oklahoma. The 5½-mile, all-weather conveyor carries limestone and shale at the rate of 1000 tons an hour from Ideal Cement Company's quarry in Lawrence to its plant in Ada.



THE MAGIC HINGE in the Private Pro teaching aid golf club is designed to "break" with an incorrect swing. If properly swung, the club acts like a regulation wood driver. Stainless steel is supplied by Allegheny Ludlum.

FORD EXPERIMENTS WITH 500 MPH LAND VEHICLE

Engineers are looking to the day when a revolutionary land vehicle, called a levacar, may travel from city to city at 500 mph or more, sliding on a thin film of compressed air.

Alex L. Haynes, of the Ford Motor Co., said his company has already built experimental levacars and is continuing to develop the idea.

In operation, levacars carrying a number of passengers, are mounted on flat-topped tracks, similar to railroad tracks. A stream of compressed air fed to "levapads," which fit around the track, lift the vehicle a fraction of an inch above the track surface. This virtually eliminates friction, while an aircraft engine provides the forward push.

FASTENEEERING

TIPS ON FASTENER APPLICATIONS BY STANSCREW

Bright or Heat-Treated Hex Cap Screws? Each can save you money

Bright and heat-treated hex cap screws (SAE Grade 5) are produced to the same dimensional specifications. Heat-treating, which results in a somewhat higher cost, gives superior hardness. The greatest difference is the higher tensile strength, as shown below.

HOW TENSILE STRENGTH COMPARES

Diameter Coarse Thread (UNC)	Bright Cap Screws Tensile Strength (Pounds)	Heat-Treated Cap Screws Tensile Strength (Pounds)
1/4"	2,200	3,800
5/16"	3,600	6,300
3/8"	5,350	9,300
1/2"	9,800	17,050
5/8"	14,450	27,100
3/4"	21,400	40,100

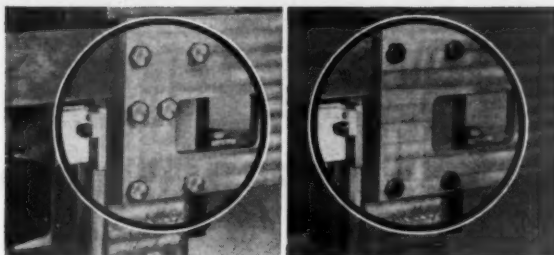
Pick The Right One

Selecting the right cap screw can mean substantial savings. For example, in the support plate assembly at right, six 3/8" bright cap screws were used. Investigation showed four 5/16" heat-treated cap screws could do the job more efficiently. By eliminating two fasteners and substituting a smaller size, total fastener costs were cut 37% . . . and important additional savings were made by reducing machining and assembly time.

The best answer for any application can be determined only after careful consideration of the advantages and disadvantages of both fasteners.

Bright Hex Cap Screw Advantages

1. In pure fatigue (no pre-stress on the fastener) the difference in fatigue strength between a bright and a heat-treated cap screw is not sufficient to offset the cost difference.
2. When bolting low strength materials, high clamping forces can cause the material under the bolt head to indent. Here the higher clamping force of the heat-treated screw offers no advantage.



Fastener costs were cut 37% when heat-treated cap screws were substituted for "brights" in this support plate.

3. In applications where joint rigidity requires a certain minimum number of fasteners, "brights" usually are the economical answer.
4. Greater availability from local sources simplifies field maintenance.

Heat-Treated Hex Cap Screw Advantages

1. In a rigid joint you get far more clamping force per dollar cost.
2. The shear strength per dollar cost is substantially higher.
3. When heads are exposed to abrasive conditions, heat-treated screws will sustain considerably less damage or wear.

Hold Inventories Down

Obviously, the best and cheapest screw for each job varies with the application. Unless you use a very large quantity of each grade, however, it is seldom wise to stock two grades of the same size and type of fastener, since this raises inventory costs. Normally the simplest and cheapest approach is to stock the stronger . . . or heat-treated . . . variety.

For Further Information

Our fastener specialists will be happy to give you further information or suggestions on specific applications. You can get in touch with them through your local Stanscrew distributor. He'll also be happy to supply you with any of Stanscrew's 5,500 different types and sizes of standard fasteners.



FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS

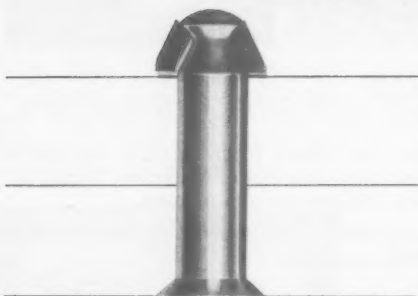
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT

WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

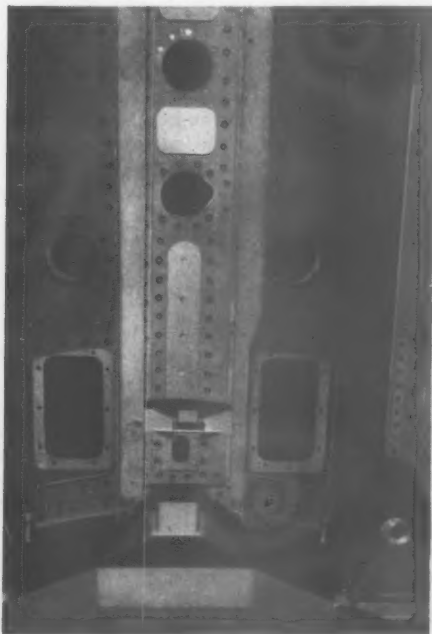


PERFORMANCE PLUS BECAUSE...



Stainless Steel Hi-Shear rivets, used throughout the Hound Dog in shear applications, meet 125,000 psi minimum shear and 220,000 psi tensile range requirements. Combined with R-Monel collars, these Hi-Shears can be used to temperatures up to 800°F.

Hi-Shears fasten structural fittings in the Guidance Compartment Doors (right) and primary structure in the Auto-Navigator area (below).

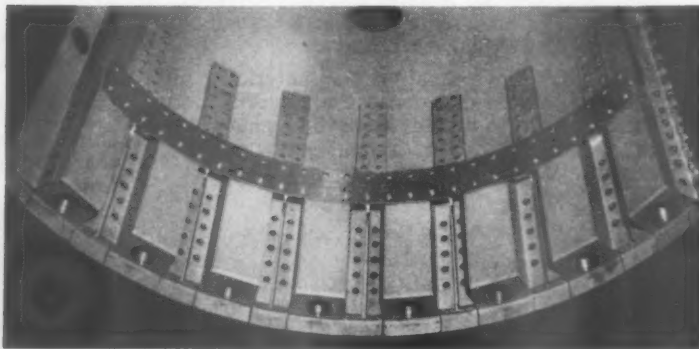


The best are blended together. A substantially greater striking range at supersonic speeds occurs when the newest air-to-ground nuclear missile, the North American Aviation GAM-77 Hound Dog is mated to its launching platform, the Boeing B-52 intercontinental bomber.

In the Hound Dog and its pylon, Hi-Shear rivets are widely used throughout the entire structure. Additionally in each B-52, tens of thousands of titanium Hi-Shears are used in primary structure... these light weight fasteners literally save hundreds of pounds of structural weight ...resulting in more range and greater payloads.

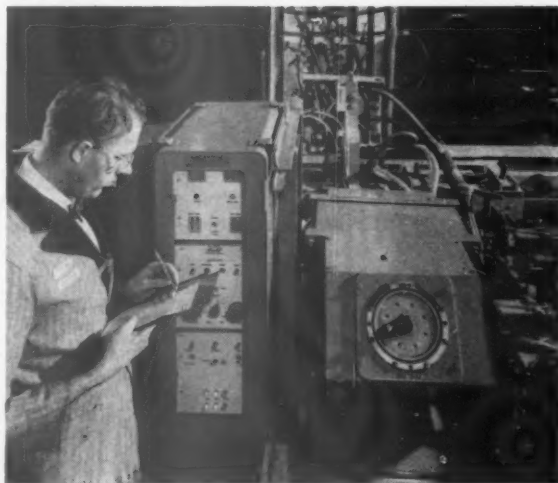
Hi-Shears, Hi-Torque bolts as well as the new preload controlled Hi-Lok fasteners are available in high strength materials up to 5% chrome die steel (156,000 psi shear—280,000-300,000 ultimate tensile range) and in temperature materials including 17-4PH to 900°, A286 to 1300° Inconel X to 1400°, Rene 41 and M252 to 1750° and ½% Ti-Moly (Hi-Shears only) to 2700-2800°F.

"HI-SHEAR" TRADEMARK REGISTERED U. S. PAT. OFFICE. U. S. PATENTS 2,355,579; 2,355,580; D-139-579; OTHER U. S. AND FOREIGN PATENTS PENDING.



hi-shear **RIVET TOOL COMPANY**
2600 WEST 247TH STREET, TORRANCE • CALIFORNIA

Assembly and Fastening Ideas



NEW CONTROLS AIM AT QUALITY SPOTWELDS

An idea conceived as early as 1943 by engineers at The Budd Company, Philadelphia, has been developed into a product being offered on a production basis. An electronic spotwelding control utilizes the feedback principle to produce "ideal" conditions for welding regardless of the actual conditions that would normally affect weld quality.

The Monautronic V-2 automatically compensates for conditions which would result in substandard welds with conventional controls. Variations in line voltage, applied force, electrode wear, variations in surface finish, fitup, thickness or hardness of material, shunting effect, contamination and other variables are corrected.

What's more, the control cannot produce a substandard weld without locking out. It prevents the operator from continuing to weld until he has corrected the abnormal condition.

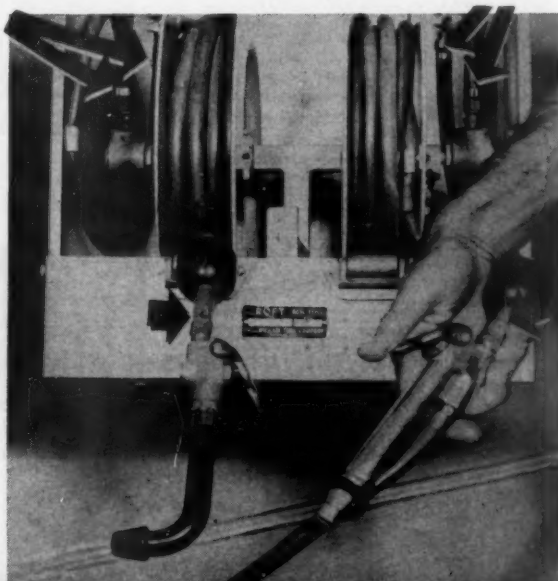
CLAMP SEALS, CONNECTS HOSE REEL LINE

William Turk Company, Lynwood, California manufacturer of spring-loaded hose reels for oil, water, and air lines gets two jobs done with one application of Circle clamps.

Reels which automatically retract the hose are used in service stations and industrial plants. A large rubber ball just below the hose nozzle or air fill valve acts as a stop to prevent the hose from winding all the way back into the reel cover. The ball also protects the fitting from absorbing the shock of the retracting line.

A clamp is used as an air-tight connection between the hose line and the valve or nozzle insert, and it also serves as a retainer to prevent the ball from being driven down over the insert. If this were allowed to happen, the insert could become loosened

continued





TRIMCLIP®

*over forty years of
industry leadership*

Do you have a fastener problem? TRIMCLIPS have been widely known and used in the automotive, radio, stove, refrigeration and aircraft industries most extensively for attaching trim panels and mouldings to the structure.

Find out for yourself the many applications of TRIMCLIPS . . . by presenting us with your problem. Send sample section, if possible, otherwise full description and details.



GAGNER

FIBRE PRODUCTS COMPANY

10151 Capital, Oak Park, Michigan
Phone JOnden 6 2366

Use postpaid card. Circle No. 217

Assembly & Fastening Ideas, continued

by continual impact and leaks could develop.

The one-piece round metal clamp has two U-shaped forward folds and is tightened by squeezing these folds together with a simple hand tool. Radial action clamps the hose evenly all around, minimizing the problem of slight

variations in hose diameter. This simplifies production assembly and repair in the field.

Also, because the clamps can take a larger variation in outside diameter than the ferrules previously used, the problem of fitting swollen rubber or synthetic lines in service is minimized.

SPECIAL PRESS AUTOMATES ASSEMBLY OF WICK-FED BEARINGS

A special press, which automates the assembly and lubrication of end bells for fhp and integral motors up to 100 hp, may also be used to assemble automotive distributors and other small wick-fed bearing assemblies.

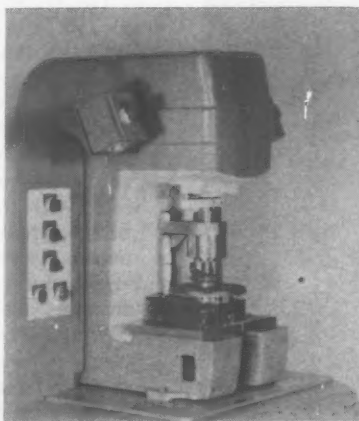
Permapress enables a four-fold increase in production rates over unintegrated assembly, states David Tann, Permapress Company president. Capacity ranges

up to 750 completed assemblies per man hour.

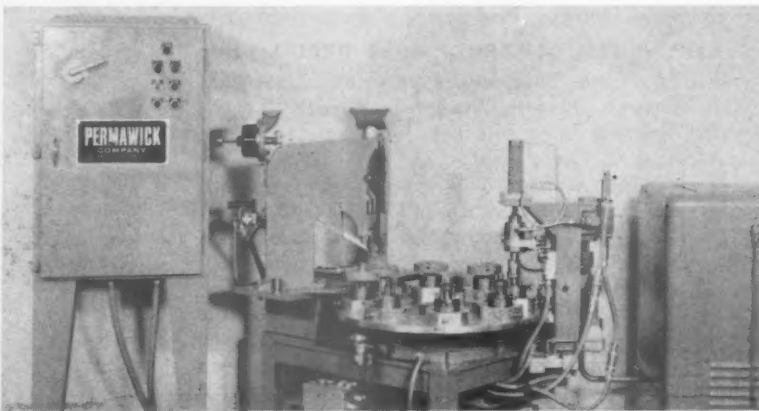
The special machine press-fits, rivets or stakes complex assemblies and injects a measured portion of fluid wicking, in a single operation. A typical electric motor assembly consists of two end-caps, bearing bracket, thrust plate, plate and rubber retaining ring. With an indexing table, the unit is adaptable to multi-stage assembly. It may also be adapted to hopper feeding.

Key to the automatic operation is the self-wicking lubricant which eliminates the need for hand inserting solid wicks. The lubricant, a blend of turbine grade oil and finely particled cellulose fibers, 85% oil by volume, is injected during the press' cycle time.

Volume of the injection is controlled to within 2/10 of a gram. 100% inspection of the filling operation is provided by a specially designed sensing switch which stops the press, if there is any error in the assembly or lubricating process.



Denison A-frame press has been adapted as basic unit of this machine.



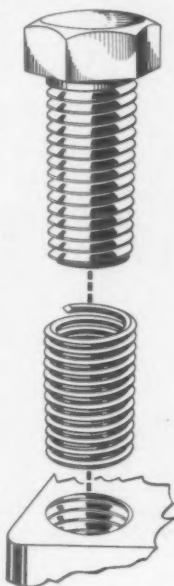
A-Tubular Rivet machine is the basic unit of this special machine which automates assembly and lubrication of electric motor end bells. Indexing table permits two stage assembly.

WIRE THREAD INSERTS SAVE \$300 REPAIR BILL

The audio-visual department of the public schools of Spartanburg, S.C. was faced with a \$300 repair charge involving eleven 16 mm movie sound projectors. The reel arm is fastened to the projector by two screws. The threads in the aluminum casting of the projector had stripped.

Stainless steel Heli-Coil wire thread inserts repaired the projectors on the spot for about \$6.50.

Standard drilling, tapping, inserting procedure was followed for a permanent repair.



BONDING METAL TO GLASS WITH EPOXY CEMENT

In the laboratory of a West Coast refinery, epoxy cement has replaced litharge and glycerine mix as a means of bonding metal to glass and creating a joint impervious to attack by hot petroleum waxes and solvents.

The application involves laboratory equipment, specifically calibrated glass tubes used for American Society of Testing Materials Method D 156-53 T.

The problem was sealing these graduated tubes into metal fittings in such a way that the joint would be chemical and heat-resistant. The seal created when a tube is cemented to its base and drain-cork must withstand a full range of petroleum waxes whose melting points are anywhere from 128 to 165°F., but where temperatures as high as 250°F. do occur.

Previously the refinery had used a litharge and glycerine mix but found that this material did not always provide a satisfactory seal and tended to be messy to use. When Metalset A-4 was used instead, a stronger, leak-resistant bond was created.

THE CARE AND FEEDING

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high or low heights*



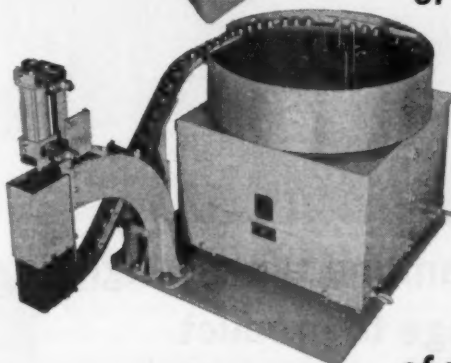
DPS ELEVATING FEEDERS

elevate, orient and feed parts of almost any size, shape and material to other machinery for processing and assembly. High capacity storage bins are designed to assure a steady flow of parts to elevating mechanism regardless of load level.

Orientation of parts is accomplished at discharge point of elevator — simplifying external track construction. Feeder can be arranged for right- or left-hand discharge. Return chutes are cushioned.

New Bulletin 2812 has full data on DPS elevating feeders. Write for your copy today.

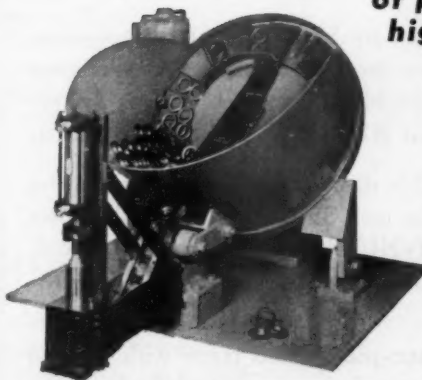
*of fragile or
finished parts*



DPS VIBRATORY FEEDERS

are bowl type units that gently handle parts too light or fragile to be handled in rotary type feeders. Through a simple electromagnetic drive, a vibrating action is transmitted to the bowl causing the parts to move up a circular, inclined track. The oriented parts then enter feed tube or discharge track to machining or assembly areas.

*of parts for
high-production
assembly*



DPS ROTARY FEEDERS

employ radially slotted or grooved rotating collector rings. Efficient orienting and feeding of parts is achieved through proper design and engineering of baffle plate, selector guard, feed track, and escapement mechanism. Three different designs are available to meet holding, orienting and feeding requirements. Safety clutch prevents damage to motor or gears in the event of parts jamming.

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This oil reservoir, fabricated by Stolper Steel Corporation, Menomonee Falls, Wisconsin, for a husky new Allis-Chalmers tractor-shovel, requires removable cover plates. This is accomplished with flush-mounted RIVNUTS and threaded bolts.

With RIVNUTS, all possible damage is eliminated, since the RIVNUTS project inside the tank. Installation is simple: holes drilled and countersunk, RIVNUTS upset with a heading tool. Flush installation permits obtaining a liquid-tight joint without grinding.

RIVNUTS are the only one-piece blind rivets with internal threads. If you'd like recommendations on a specific fastening problem, please send a print of your part. For descriptive bulletin, see Sweet's Product Design File, or write *Dept. AE-7, B. F. Goodrich Aviation Products, a division of The B. F. Goodrich Company, Akron, Ohio.*



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REPORTS FROM THE FIELD



Blind rivets are installed by pneumatic power tool to join gussets to aluminum tubing to form outrigger structure.



World's largest three-axis antenna has exceptional structural rigidity. The 60-ft. aluminum reflector weighs 15 tons.

CHOOSE ANTENNA FASTENERS FOR SHEAR, TENSILE STRENGTH

To meet high shear strength requirements, over 30,000 blind rivets are used in assembling the world's largest three-axis antenna.

In addition to the Huck OS rivet, whose hole-filling characteristics contribute to its shear strength, the antenna design calls for Huck lockbolts for all mechanically joined structural assemblies in the deflector and supporting framework.

Designed and developed by Philco Western Development Laboratories, Palo Alto, Calif., the antenna has been built for the Air Force under contract to the Lockheed Missiles and Space Division. It is to be used for reception of telemetered information and data from satellites and missiles in any phase of flight.

The need for rigidity in the structure is evident from the performance specifications set up. The antenna responds to tracking

commands to an accuracy of plus-or-minus two milliradians (about .11°). Low deflection characteristics are built into the framework and deflector through square aluminum tubing assembled with fasteners having high shear and tensile strength, clamping action and positive mechanical lock.

Huckbolts were chosen for their speed of installation, positive pull-together action and positive mechanical lock. Conventional blind rivets were used in other non-structural areas, such as deflector skin attachment.

The 3/8" nominal diameter rivet is made up of a 7075-T6 aluminum alloy pin and a 5056-H14 aluminum alloy sleeve. Ultimate shear strength is 4535 lb.; installed average tensile strength is 3320 lb.

The lockbolts of 2024-T4 aluminum alloy have installed shear strength of 4650 lb.; tensile strength, 4730 lb. Installation is by air power tool.

GANG CHANNEL CUTS PRINTED CIRCUIT MOUNTING TIME

Using a gang channel instead of individual nuts, mounting time of printed circuit connectors was cut by two-thirds in a time-motion study of electronic assembly at Hughes Aircraft Company, Fullerton, California.

The part, a Kaylock G19199 miniature gang channel, uses tiny self-locking, floating nuts. Other advantages: Elimination of specially designed, spin-type wrench; no reaching around the assembly to position nuts; worker remains

continued





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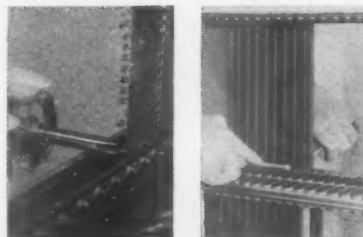
Field Reports, continued

comfortably seated throughout most of the assemblage.

Maximum channel width is .300". Material of the channel: type 321 cres. Nuts: carbon steel, 4-40 thread size, with service temperature up to 500°F.

DIFFUSION WELDING MAKES BONDS POSSIBLE AT 650°F

Advances in diffusion welding now make it possible to obtain excellent bonds at temperatures as low as 650°F, metals joining specialists at Battelle Memorial Institute report. The new method, related to forge welding, involves the use of one or more intermediate metals to join the base material. D. C. Martin, a welding technologist at the Columbus, Ohio, research center, said that intermediate metals used in studies at Battelle have usually been ones which could be applied by plating.



Before changeover to channel, installation required use of two tools and a long reach. Now, using gang channel, connectors are mounted with one tool, less fatigue, in one-third the time.

Intermediate metals, he explained, make it possible to make joints at temperatures far below those which would be required if two pieces of metal were pressure bonded directly to each other. In some cases, the intermediate metals provide a further advantage. They may also drastically reduce or eliminate the need for deformation during bonding.

G.E. BONDS SIX DISSIMILAR PLASTICS IN NEW HAIRDRYER

A new portable hairdryer required adhesives which would bond diverse plastics. Raybestos-Manhattan, Inc., collaborated with General Electric design and manufacturing engineers to meet this need.

Adhesives were tested over a temperature range of -10 to 160°F. The decorative case medal-

lion was subjected to a shear stress of 25 lbs. as its location invited much scraping or jarring. All bonding points were tested for tensile strength (35 lbs. test) peel strength (20 lbs. test), and reaction to ozone atmosphere to insure joint resistance to corrosion and hard use. Elevated temperature

continued

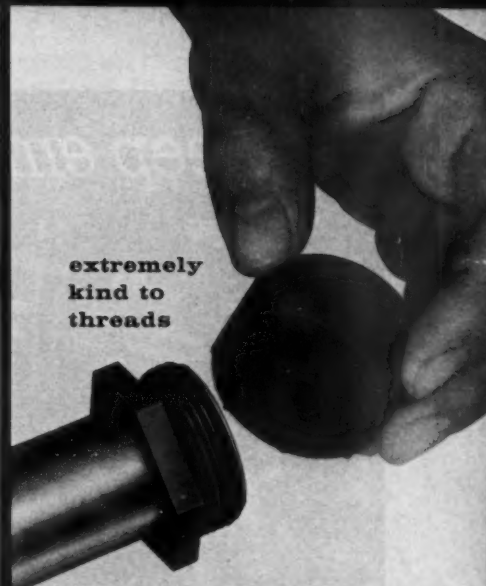


One of two machines General Electric designed for applying adhesive. The hip pad passes between the two rollers at right. The lower roll rotates through a trough containing the adhesive. Adhesive is picked up from the lower roll and pressed into the bottom of the hip pad. The pad is then placed on the dryer case as shown at left.

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the one at left in the view-master above, and supply uniformly perfect fasteners like the Hubbell one at right.

Contrast the two. Note how the Hubbell fastener at right is completely free of burrs or dirt that might jam an automatic machine. Also see how sharp and clean the threads are, and how deep and precise the slot. All these things add up to faster production, less down time, fewer rejects and a better end product.

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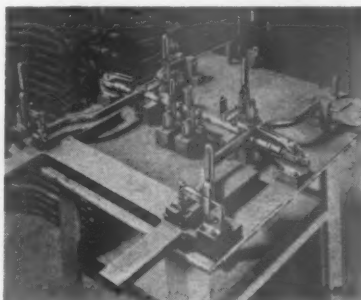
Field Reports, continued

creep and dead load strength, resistance to water, 100% humidity, and cleaning solvents were also tested.

Four Ray-Bond rubber base adhesives were chosen. They are of the solvent release type, set at room temperature and thermoplastic. They dry immediately which is important as they are applied to components which move on an assembly line at the rate of five per minute. Except for the hose connection, the bonded parts are pressed together by hand. The hose connection is assembled in a fixture. The only machinery developed for bonding was to apply the adhesives.

HOW ONE WELDING FIXTURE NOW DOES THE JOB OF MANY

An adjustable welding fixture, devised by W. M. Hoehn, plant manager at Schieber Mfg. Co., Detroit, reduced tooling costs for manufacturing folding-table legs. The new design eliminated the need of having separate fixture for legs of different lengths.



Key to the design is an integrally built H-frame that slides on ways to suit any length leg required.

The assembly operation starts by locating a hinge-pin (which has been previously welded to a cross-bar) in V-blocks. The cross-bar, with slightly flattened ends, rests on support blocks. Side members of the assembly (the legs) are located from holes drilled near their ends during prior fabrication. The H-frame is then pushed against the opposite ends of the legs to provide a snug fit against end-stops. The legs are locked in position by De-Sta-Co 210 clamps on the H-frame. •

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Producing the B-70 Space Age Bomber



by William D. Engstrand
West Coast Editor

"How do you accomplish a job when no one knows how to go about it?" This paradoxical problem faced North American Aviation, Inc. when the company accepted the development contract on the first true space-age bomber.

Two years ago, the B-70 Valkyrie could not have been built. Designed to fly at 2000 miles an hour, and at altitudes ranging from 15 to 20 miles above the earth's surface, specifications relative to strength requirements and manufacturing tolerances exceeded anything that had ever been attempted before. Neither the equipment nor the know-how to meet these requirements was available at the time.

North American technical officials coined a phrase to describe the new bomber: "The B-70 had to be as strong as a bridge; as precise as a fine watch."

Transforming that phrase into a production reality involved

The Valkyrie may be as great a milestone for industry as it will be for defense. Here's how North American solved first-time production problems through a company-wide crash development program.

one of the most comprehensive and concerted manufacturing efforts ever attempted by American industry.

Among other things, while new high-strength alloys were being developed to meet the strength requirements of the B-70 specs, shop knowledge on how to work these alloys in the quantities required for fabrication was entirely lacking. Some of these new alloys just will not submit to the conventional shop practices used with the more common alloys. New techniques for heat treating, machining, forming and drilling had to be worked out.

Second, joint strength requirements indicated that fusion welding had to be used. This posed an extremely difficult problem, for in initial attempts to weld the large thin-gage sheets used in B-70 skin fabrication, localized heat from the welding torch puckered and warped them far beyond allowable tolerances.

A third major problem was generated by the large amount of sandwiched honeycomb panel construction used throughout the new airplane. While honeycomb construction was nothing new to the aircraft industry, the specifications and size of the panels used in the B-70 project exceeded any that had been used before. This necessitated the development of new techniques for panel brazing, and for inspecting the panels after brazing.

At the start of the B-70 program, a survey of the problems involved made it apparent that practically every manufacturing and assembly department in the shop would be affected, and that an organized, shop-wide attack would be necessary to solve them. This survey led to the organization of a Manufacturing Development Program (MDP) which in itself was almost as unique as the many problems it was called upon to solve.

To get the program started, top manufacturing and supporting personnel from the various departments affected by the B-70 problems were assigned the responsibility of researching and developing MDP projects in their special lines. These lines included the familiar operations of tooling, machining, forming, heat treating, and assembly, as well as entirely new lines of endeavor made necessary by B-70 requirements. Thus, by immediately submitting the problems for shop-level solution, practical production problems were solved concurrently with the development of new techniques.



Honeycomb panel brazes are X-ray inspected.

Twenty-eight specific projects were included in the original MDP, including such diverse efforts as Ceramic Tooling; Welding and Straightening of Thin Gauge Sheets; Contouring Sandwich Panels, and various methods of Brazing. Also included were projects dealing with new adaptations of more familiar operations such as High Temperature Tube Splicing; Manual and Automatic Fusion Welding; High Temperature Plastics and Adhesives; Forming of High Strength Materials, and the adaptation of familiar processes to new and exotic alloys such as Rene 41.

The results of this concentration on all problems at one time were gratifying indeed. Today, North American Aviation is ready to produce B-70 bombers that will meet each specification. But this does not mean that the revolutionary Manufacturing Development Program has ended. Inspired by the confidence placed in them by management, manufacturing and shop personnel are still going "all out" to refine and improve their original solutions to the numerous problems.

continued



Producing the B-70, continued

As mentioned earlier, the necessity of using fusion welding as a means of joining thin metal created several difficult problems. In all, there will be more than 19,000 lineal feet of fuel-tight fusion welding in each airplane. Many of these welds will be accomplished in sheet stock only .006" thick. Mere handling of large sheets of this gauge posed a tremendous difficulty.

To handle these thin sheets through the nitric acid bath used prior to honeycomb brazing, and to transport them about the plant, a huge wire-and-screen drum, 7 ft. in diameter and 12 ft. long, was constructed. The sheets are simply curled inside this drum during handling. As pointed out by a North American shop superintendent, "Sheet material only .006" thick was once considered as foil. It's harder to handle than paper. And even the slightest wrinkle will be cause for rejection."

Much of the fusion welding on the B-70 is accomplished by machine. However, at the start of MDP, available welding machines were not large enough to handle the huge components. In most previous machines, the torch position was restricted to a vertical position directly above the work, and welding was accomplished while the work passed under the torch. An about-face was necessary in welding the B-70 components. Because of their size, they could not be moved or rotated under a stationary torch. New means of keeping the work stationary and moving the torch along a precise path had to be developed. Today, equipment is available which, by tracer control, will cause the welding torch to follow any required path and produce a sound weld in any position. Integrated closed-circuit television is used which permits visual monitoring of the weld area at all times.

HAND WELDING IS ALSO REQUIRED

Despite the amount of machine welding performed, a great deal of hand welding is necessary. Here again the unprecedented demands for accuracy and strength are felt. Most critical of the various hand-welded structures are the fuselage carry-through frame sections composed of rugged yet very accurate sections of steel. These sections along with numerous stiffeners, must be hand welded together. It was soon discovered that



Top left: An operator monitors the lighting of the furnace used in heating parts.
Top right: A large section of the fuselage is being welded.
Bottom left: A large section of the fuselage is being welded.
Bottom right: A large section of the fuselage is being welded.

localized heat produced by the welding torch would warp these critical members far beyond allowable tolerances.

PARTS MUST BE PREHEATED TO 600°F

To solve the problem, an entirely new concept of welding at elevated temperatures was developed. This involves heating the entire part before and during welding. Preheat temperatures of around 600°F are used. Heating, according to the shape and size of the part, is accomplished in a furnace or electrically. Maintaining the temperature of a furnace-heated part during welding is accomplished by swathing it in asbestos insulation material. The welder merely probes his welding torch through a small, temporary opening in the asbestos blanket to accomplish the work.

It has long been known that roll-planishing of a fusion welded seam will improve both its appearance and its metallurgical properties. But machines large enough to roll planish the welded B-70 sections just didn't exist. So North American tooling engineers built their own roll-planisher, a huge device which can apply up to 19,000 lbs. pressure on the planishing roll and flatten a fusion seam until it looks like a part of a continuous sheet.

A technique called "hot sizing" will also be extensively employed in producing the B-70. In this process, blanks of steel are placed between

dies shaped to form the desired part. While the dies are closed upon the blank, they are electrically heated to about 1200°F for a period of five minutes. Pressure maintained on the dies during this heating cycle causes the metal blank to slowly "creep" into the desired form.

Heat is used also in an adaptation of stretch press forming. The sheet to be stretch formed is first clamped in the jaws of the press. Then banks of quartz lamps are moved in so that the heat they generate will be radiated directly onto the sheet. When the correct temperature has been reached, the sheet is then stretch-formed. This method is much faster and more efficient than the older method of first heating the stretch press dies, then heating the sheet to be formed by conduction from the dies.

NEW BRAZING METHOD FOR DUCT JOINING

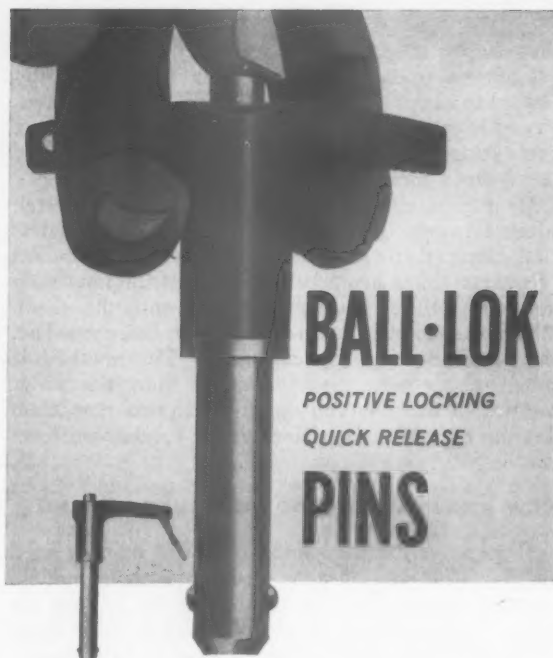
Because of the thousands of feet of ducting used in the B-70, considerable research was devoted to developing new brazing techniques for joining the tubes. In the process developed, a short sleeve lined with the necessary brazing material is first slipped over one of the two tubes to be joined. Then, after the tubes are butted together, the sleeve is slipped into position over the joint. An induction heating coil is used to bring the sleeve to the proper brazing temperature. As the brazing material melts and

continued



Left: A massive assembly fixture keeps steel part from warping during heated welding process. Top right: Asbestos insulation retains heat in pre-heated part while fusion welding takes place. Bottom right: Remote induction heating coil brazes tube joints in simulated B-70 assembly. The generator is in distant center back ground.





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Producing the B-70, continued

bonds with the tube, a lightweight yet strongly reinforced tube joint is formed. This method saves considerable weight over the older method of using flanged bolt couplings in tube joining.

In conjunction with the above tube brazing process, a remote induction heating coil was developed. Energy for the heating coil is fed through wires from a distantly located generator. Leads up to 100 ft. in length have worked successfully. With this remote unit, tube installations located in hard-to-get-at areas may be easily brazed. The generator is merely moved into a position somewhere adjacent to the brazing operation, then the leads themselves are used for extending the heating coil to the desired location.

In the B-70 Manufacturing Development Program, four methods of brazing were developed or refined for use. The luminous wall furnace method is used for large parts with moderate contour. Salt bath brazing is used for small, flat honeycomb panels. The electric blanket method, using a ceramic form to control the shape of the panel during heating, is used for brazing severely contoured parts. And an old North American development (a die quench process in which the part is held in dies while it is rapidly cooled) is used to produce brazed parts with improved metallurgical properties.

Because of the huge amount of welding and brazing employed in B-70 construction, along with



An automatic welder, its electronic eye tracing a pattern, was adapted to fusion welding.

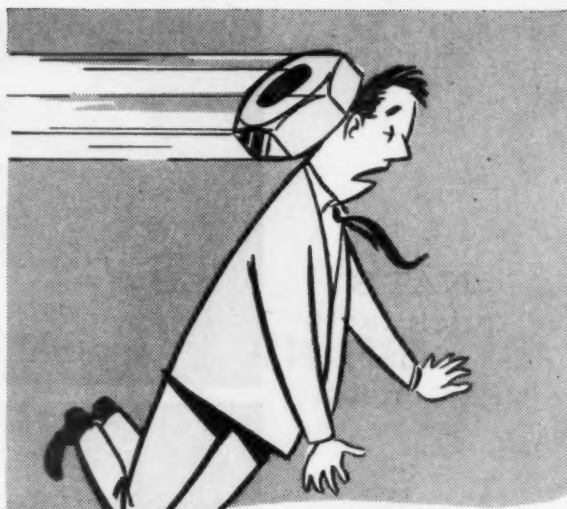


Weld seams in hard sheet steel are roll planished to smooth the finish, improve metallurgical properties. The wheel operates at up to 19,000 lbs. pressure.

numerous brazed honeycomb panels, special inspection techniques had to be developed. An adaptation of the ultrasonic inspection process will be used for brazed honeycomb panels. Here the brazed panel is inundated in a tank of water, then high frequency sound waves are bounced through it. A photo-sensitized paper records these sound waves as they emerge from the panel. Any defect in the braze where the core is joined to the skin will show up.

All fusion welds must be inspected 100% of their length, and to accomplish this, "in motion" X-ray machines were developed. This machine is merely moved along the joint, making a continuous X-ray exposure as it moves. This is simpler and faster than having to expose the weld seams in sections, with a negative for each section inspected.

A full report on all developments resulting from the Manufacturing Development Program is far beyond the scope of this article. But insofar as technical progress is concerned, the manner in which these developments were achieved is more important than the various machines and processes which resulted. By attacking a host of new problems in a shop-wide assault, by involving both engineers and people who will ultimately do the producing in developmental work, problems were not only quickly solved, but solved on a practical production basis.



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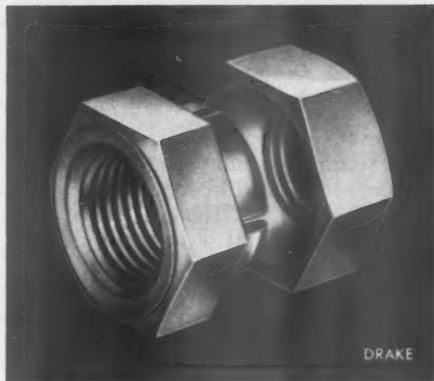
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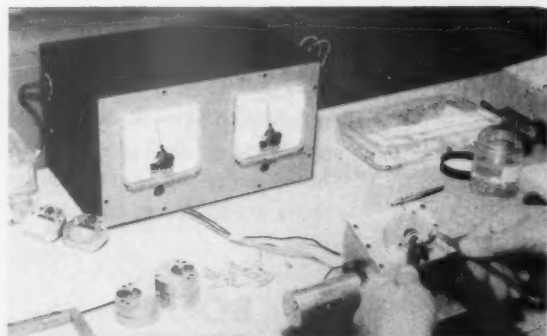
CONTROLLING NUT TIGHTNESS WITH RELAYS



Method of controlling nut tightness with relays was developed for fastening meter movements to magnets. In first step, nuts are placed in cups of jig, where they will be driven by drive shafts inside the fixture.



A meter movement, which is to be fastened to a permanent magnet, is placed in specially-built assembly jig.



In this view of meter fastening operation, the cut-off point has just been reached on meter-relays in background. Tightening method was developed at Assembly Products.

A means of controlling the tightness of nuts—without concern for driving time or speed—has been developed by Assembly Products, Inc., of Chesterland, Ohio. The new method is used in the assembly of meter-relays, indicating meters, controlling wattmeters and other sensitive controlling instruments made by the company. While the fixtures are designed only for the assembly of instruments, it is believed that the principle involved will have applications in the assembly of other products.

Engineers at Assembly Products report that in their approach, tightness is proportional to the load on an electric motor. When the load reaches a pre-set point, the motor driving the nuts is shut off. (With d-c motors, load is indicated by current required; with most a-c motors, load should be read as power on a watt-meter.)

In the application at Assembly Products, the device runs down nuts on screws that fasten the movements of meters to permanent magnets. To control nut tightness, company engineers hooked up a simple version of their Load Sentry, a control which protects motors and tools against overload.

The control can be used with either a-c or d-c motors of about any size, from "fleapower" units drawing only a fraction of an ampere to those requiring 50 amperes or more. With a-c motors, 500 milliwatts is about the minimum. A simple device can be built in to prevent surges of starting current from being a problem.

The motor load for each nut being driven is indicated and controlled by a meter-relay. This device has an adjustable pointer that sets the limit of permissible current—the level at which a small motor will drive a nut to just the right tightness. Another pointer indicates the amount of current being drawn short of the limit. When the two pointers meet, they lock contacts and close a circuit that energizes a relay. The relay turns off the driving motor. Since the apparatus used at Assembly Products drives two nuts at once, it includes two motors and two meter-relays.

The motors in the control are 28 volt, d-c aircraft type motors rated at .002 hp. They are turned off when they draw 400 milliamperes of current. This setting was determined by trial and error. Without attempting to measure the actual torque involved, engineers at Assembly Products simply kept adjust-

continued

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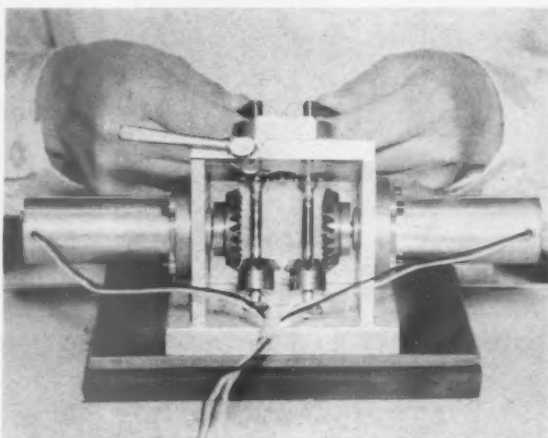
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Controlling Nut Tightness, continued



Nuts are driven by these gears which in turn are driven by .002 hp d-c aircraft-type motors. Load on the motors is indicated and controlled by meter-relays.

ing the set point on the meter-relay dial until a point was reached that reflected the nut tightness they wanted.

The time often varies before this current level is reached, but different time intervals have no effect on nut tightness. Nuts are driven until the current is 400 milliamperes. Conversely, a nut is not tight until this level is reached.

Since the meter-relays have a repeatability rate of a fraction of 1% of full scale, the driving current is almost constant. This means that the meter pointer always returns to the same place when a given signal is applied.

A specially-built jig is used at Assembly Products to hold the meter movement and the magnet while they are being fastened. Nuts are placed by hand in cups on the ends of the drive shafts. The hexagonal heads of the screws are held by tools while the nuts are driven. The screws have a 6-32 thread and are about 5/8-inch long, brass with cadmium plating.

A pedal starts both motors simultaneously, and the motors run only when the pedal is pressed and when the current is below the set point.

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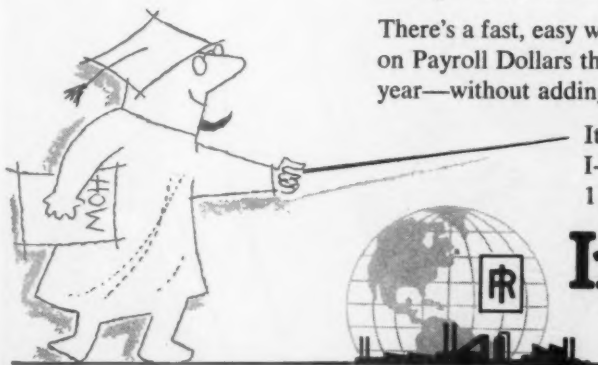
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*A summary of facts which have been
concluded about the problem of hydrogen
embrittlement in cadmium plated fasteners*

HYDROGEN EMBRITTLEMENT IN FASTENERS



by **Robert L. Sproat**, Manager
Research and Development
Standard Pressed Steel Co.

The introduction of high strength steels has been followed by a series of delayed service failures. These failures, some catastrophic in nature, have occurred in structures which are subjected to static axial loads much below their ultimate strength.

Investigations have proved that these failures were caused by hydrogen which diffused into the metal during the electroplating operation. The following facts have been concluded concerning hydrogen embrittlement:

1. The higher the stress in the structure, the shorter the time to failure (1, 2)*.
2. There is a threshold value of hydrogen concentration for a steel, at a certain heat treat level, above which embrittling is critical.
3. The greater the amount of hydrogen in the steel, the more prone the metal is to embrittlement; thus failure will occur in a shorter period of time and at lower stresses (1).
4. The higher the tensile strength or hardness of the material, the greater will be the embrittling effect of hydrogen (1, 2).
5. Types of steel as well as different heats within the same type will have varying degrees of embrittlement in the presence of the same amount of hydrogen (2).
6. Higher carbon steels are more susceptible to hydrogen embrittlement than lower carbons (3).
7. Hydrogen concentration of plated work is greater near the surface; thus thin sections are more susceptible to embrittlement.
8. Greater recovery results from longer baking times and higher temperatures.
9. Dense, impervious coatings have a low rate of outgassing. Hydrogen will diffuse inward in such situations (5).

Figure 1 illustrates the relationship of stress level, tensile strength, methods of heat treating, and rupture time for an embrittled SAE 4340 steel. This is

*Numbers refer to bibliography at the end of article.

the summary of result of work conducted by E. R. Slaughter at the Battelle Memorial Institute.

It should be noted that those lots of steel with the highest tensile strengths generally failed at lower stresses and at shorter times. It should also be noted that embrittlement is possible at tensile strengths as low as 75,000 psi. By comparing the two 190,000 psi lots, little difference is noted in the normal tempered martensite and austempered bainite structure. This indicates that the method of heat treatment and resultant microstructure did not have a strong influence upon the results.

A summary of some current plating specifications is listed in Figure 2. There have been many investigations of cadmium plating procedures and baths. This work was conducted in an effort to minimize the amount of hydrogen absorbed during the finishing operation.

DETECTING EMBRITTLEMENT

Tests for embrittlement have been varied and inconsistent. Some investigators have conducted smooth bar tensile tests, using reduction in area values as an indicator of the degree of embrittlement (4), while others have evaluated sustained loading of smooth tensile bars (1), notched tensile bars (2, 6), stressed rings (5, 7) and bolts (1, 8). It would appear from a review of the above investigations that the sustained load tests are the most sensitive. Steels which are embrittled by hydrogen will fail within one week under sustained stress if failure is to occur.

In recognition of the catastrophic failures which could result from embrittled parts, careful control must be maintained over the heat treatment, grinding, pre-plate cleaning, plating, and post-plate baking of high strength fasteners. The very design of a bolt with its many stress risers and notches, and its normal usage under conditions of high sustained and dynamic stresses, makes it susceptible to failure by hydrogen embrittlement. With carefully controlled production practices, such failures can be prevented.

The previously cited investigation indicated that steels with higher hardnesses and carbon contents are most prone to embrittlement by hydrogen. Therefore, the most modern furnace equipment and

continued

Hydrogen Embrittlement, continued

carefully-controlled atmosphere practices should be followed in the heat treatment of steel parts. This will help assure that the tensile strength levels are within the required values and that no surface carburization, however slight, is present on the finished work. Surface carburization—whether occurring accidentally or purposely—is most undesirable for cad-

mium plated high strength fasteners. It results in a critical combination of high hardness, high carbon content, and high surface stresses.

Sometimes carbon restoration treatments are used to reduce the cost of fabricating bolts. However, present methods of controlling carbon restoration are inadequate to assure a uniform, reliable product, and should not be considered for high strength bolts.

We have found it necessary to grind heat treated

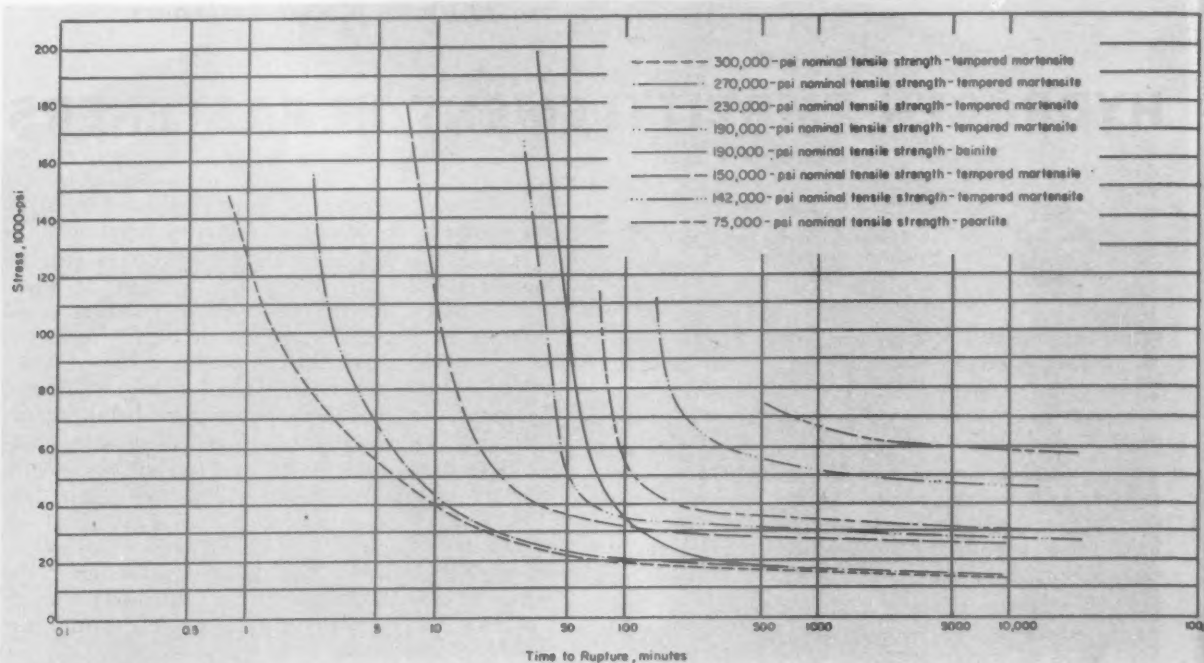


Figure 1—Stress rupture characteristics of an SAE 4340 steel which was embrittled by hydrogen (WADC TR 56-83).

Source	Specification No.	Type Bath	Pre-Plate Cleaning Method	Post-Plate Baking
Bendix Aviation Corp.	PS 1008	Cyanide Cadalyte brightener	Mechanical cleaning	375°F for 23 hrs.
Boeing Airplane Co.	BAC 5021 Method II	Cyanide No brightener	Anodic acid pickle (Sulfuric acid—magnesium sulfate)	375°F for 3 hrs. below 220,000 psi 375°F for 23 hrs. 220-240,000 psi
The Cleveland Pneumatic Tool Co.	8206	Cyanide No brightener	Anodic acid pickle 220-240,000 psi (Sulfuric acid—magnesium sulfate) Mechanical clean— 260-280,000 psi	380-400°F for 23 hrs.
Douglas Aircraft Company, Inc.	DPS 9.28-1	Cyanide No brightener	Acid pickle below 260,000 psi Mechanical clean above 260,000 psi	375°F for 3 hrs. below 260,000 psi 375°F for 23 hrs. above 260,000 psi
Lockheed Aircraft Corp.	491 G (Pre-release)	Cyanide Special LAC C-5 additive	Mechanical cleaning	375°F for 3 hrs. 150-240,000 psi 375°F for 16 hrs. 260-280,000 psi
North American Aviation, Inc.	PR 3-1	Fluoborate	Anodic acid etch	375°F for 23 hrs.
Military	MIL-C-8837	Vacuum deposited	Mechanical cleaning	None required
National Aircraft Standards	NAS 672	Fluoborate	Nitric acid dip	375°F for 23 hrs.

Figure 2—A summary of some current plating specifications designed to minimize the amount of hydrogen absorption.

bolt blanks to remove surface imperfections, decarburization from the original stock, and to establish close dimensions and surface finishes. However, this grinding can be another source of trouble if done improperly. High surface tensile stresses and overheating can result from improper grinding. The overheating may be severe enough to result in hard spots or cracking. The combination of surface tensile stresses and high surface hardness which accompanies the hard spots will make such parts more prone to failure by hydrogen embrittlement.

Grinding coolants, feeds and wheels must be selected and maintained to assure low stress grinding. Even in consideration of these extreme controls, all high tensile aircraft fasteners which are heat-treated in excess of 160,000 psi should be thermally treated after grinding and prior to thread processing. This treatment, conducted within 25°F of the original tempering temperature, relieves the grinding stresses and hard areas. It is necessary to use atmosphere furnaces for this operation since any scaling will result in changes in dimensions and finish of the completed blank. Stress relieving at lower temperatures is ineffective.

Heat treat scale and foreign materials should be removed from high strength bolt forgings by mechanical cleaning rather than by acid pickling. Such heavy acid cleaning would add large quantities of hydrogen to the heat treated parts.

Standard aircraft fasteners should be cadmium plated under controlled conditions to assure freedom from hydrogen embrittlement. Full consideration was given to developments and experiences at both our company and elsewhere in selecting the plating procedures. In general, the following practices are followed:

	A	B	C
Tensile Strength of Fastener	Less than 180,000 psi	180,000 to 250,000 psi	250,000 psi and higher
Specification	QQ-P-416	NAS 672	MIL-C-8837
Type Bath	Cyanide	Fluoborate	Vacuum
Baking Practice	3 hrs. at 375°F	23 hrs. at 375°F	Not required

Baking must be started within a short time (one-half hour) after completion of the plating operation.

For bolts heat treated in excess of 250,000 psi, vacuum-deposited cadmium coatings are recommended. Through the use of this process, there is no possibility of the introduction of hydrogen during the finishing operation.

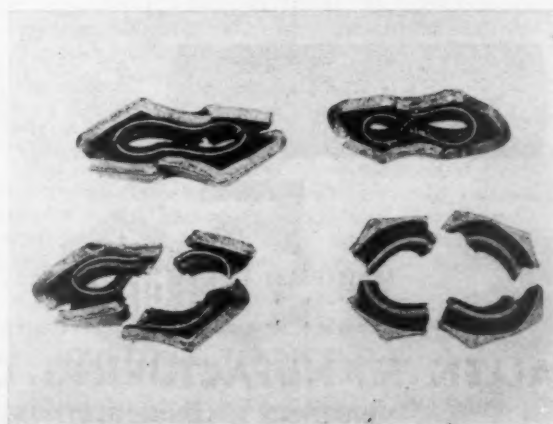
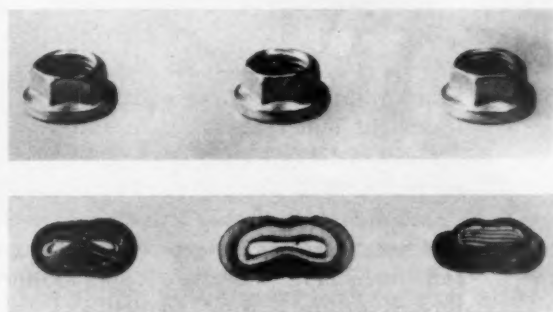
HIGH STRENGTH NUTS

In the past few years there has been an increased demand for minimum weight nuts, although there has been virtually no customer or government requirements exercised on nut manufacturing as on bolt manufacturing.

From field experience and laboratory studies, it appears to be a very marginal practice to use thin walled nuts at extremely high hardness (over Rc 45



A simple means of indicating brittleness in a thin-walled nut is to squeeze the nut in a vise. Even though this test does not necessarily reveal embrittlement by hydrogen, it does indicate those minimum weight nuts which are most prone to hydrogen embrittlement.



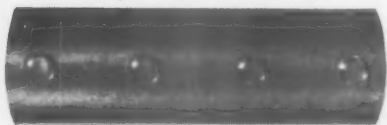
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Hydrogen Embrittlement continued

or 215,000 psi). The hoop stresses that are developed in a loaded nut place the surface fibers under high tensile loads. Under this condition of stressing, the transverse ductility of the metal is a controlling factor. In wrought steels the transverse ductility is much less than the longitudinal ductility, thus adding to the possibility of brittle failures. This critical stress condition of a loaded nut makes it more prone to failure by hydrogen embrittlement than even a bolt.

In recognition of the possible consequences of brittle nut failures, lightweight high-strength nuts should be fabricated from alloy steels which have less inherent brittleness than plain carbon steels. Once again, carefully controlled cadmium plating and baking practices must be followed.

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This article explores possibilities of extending assembly techniques used in the electronic industry to other fields

THE CONCEPT OF MODULAR DESIGN

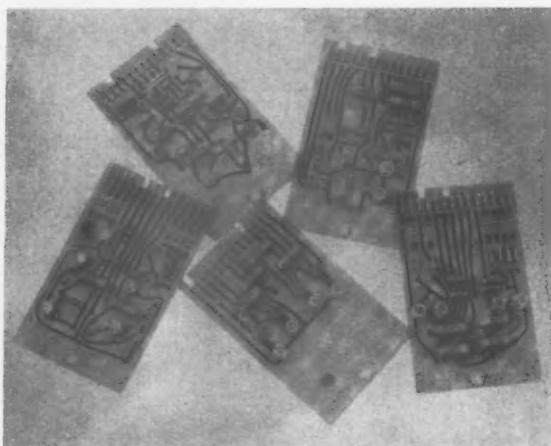


Figure 1—Modules suitable to mechanized assembly.

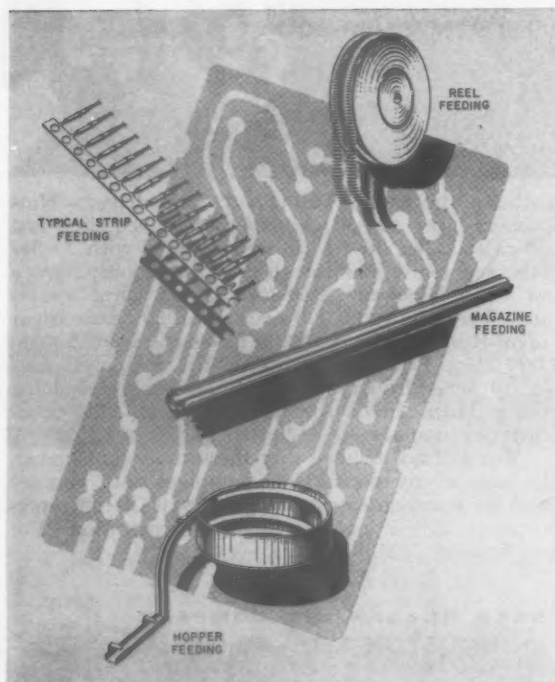


Figure 2—Methods of feeding electronic components.

It is interesting to examine the philosophy, history and evolution of engineering developments. In the case of modular units we should not be misled into believing that they are new. In the electronic industry we at Melpar have been using this type of construction for more than 10 years. We have helped pioneer miniaturization, subminiaturization, and microminiaturization, and are presently directing our attention to the ultimate reduction of module size using molecular, or quantum techniques.

It is the intent of this article to point out the possibilities of extending the basic concept of modular construction and production techniques, such as are used in the electronic industry, into other fields—especially that of mechanical equipment.

Many industries producing a wide variety of end products are directing their attention to modular constructions. This approach provides a breakthrough in the conventional methods to obtain improved reliability and increased productivity.

An excellent and typical use of the modular concept has been its application to servosystem components. These components generally are electromechanical devices utilized to meet specific requirements. They perform functions singularly, or in combination with other modules. Prior to the use of modules, it was found that the servosystem meeting the many specified requirements had been expensive to develop and manufacture. Modular construction simplified the development and reduced the cost of manufacturing. Modules reduced the number of parts necessary to couple them into a working system. Modular construction also increased the number of catalog shelf items. There is a saying that "simplicity is hard to obtain", but modular construction seems to be a good guide for obtaining optimum simplicity.

No attempt will be made to define the word "modular", because it might wrongly set up a restriction or limitation. However, we do think of modules as building blocks. We think of them as units which are manufactured to permit interchangeability, replaceability, and general usage in more than one equipment or system.

The desire and need for modular units stem from the fact that they are generally designed for specific functional purposes and can become a shelf item for use in diversified systems. The electronic industry provides an excellent example of the way



by **A. Arnold Lawson**
Consulting Project Engineer
Melpar, Incorporated
Falls Church, Virginia

FOR MECHANIZED ASSEMBLY

in which modular building blocks in the form of functional circuits can be assembled into a variety of equipment such as computers, data-processing systems, and punched-card or magnetic-tape programmers.

The benefits derived from the use of modular units are innumerable. In complex equipment if a modular unit malfunctions it can be replaced promptly with a minimum of down-time. As a shelf item such units eliminate the need for redesigning them into a new system each and every time there is a need for the function that they perform. When the need arises for the development of a new system, it is possible to incorporate available existing modules. This reduces the cost and the amount of time needed to accomplish the design phase.

There are several general principles which must be followed in the design of modules to establish an orderly production interrelationship among them, even though they may have a variety of functional usages. The ultimate objective would be to have all modules the same size. This is generally not feasible, and makes it necessary to design them in sizes which are multiples of a basic unit.

In the electronic industry, the trend during the past 5 years has been to reduce drastically the size and weight of the modules. This trend is continuing to the extent that an intense effort is being made to obtain ultimate reduction in size by the application of new materials and exotic techniques. The need for these techniques is immediate for aircraft, missile, and space-vehicle equipment. These techniques will undoubtedly be resolved within the next decade. Admittedly the techniques will be complex, but the end product (module) will have ultimate simplicity and reliability. We can anticipate many technical articles and papers reporting the progress of this work.

BASIC DESIGN OF MODULAR COMPONENTS

The design engineer must keep in mind that the success of his development of modules depends on the application and utilization of much standardization. Standardization will simplify many manufacturing operations, and it may permit the use of identical tooling and assembling equipment.

The application of standardization is basically associated with the components within the module and the base which supports and/or retains them.

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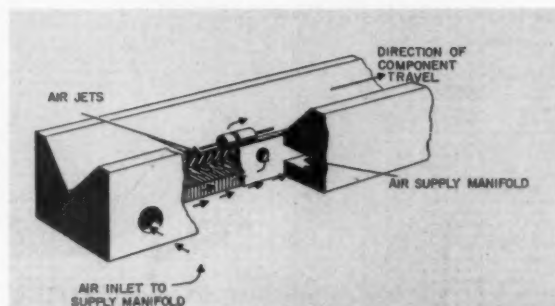


Figure 3—Component air track developed by Melpar.

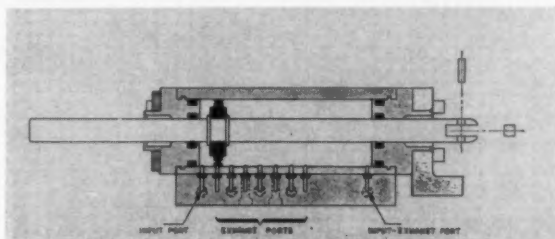


Figure 4—Servomotor developed for Mini-Mech system.

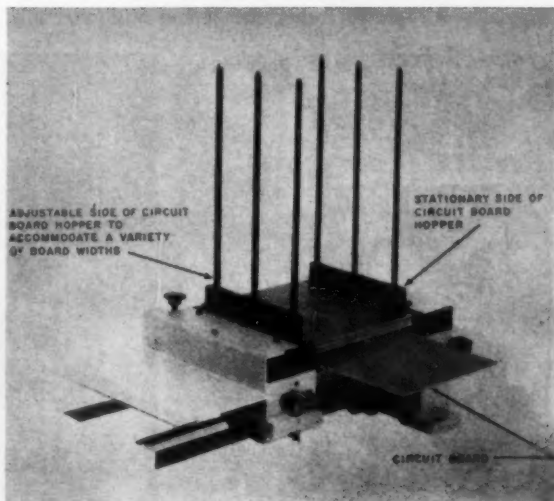


Figure 5—Adjustable hopper for feeding circuit boards.

Design for Mechanized Assembly, continued

In electronic equipment the base is a printed foil-clad board and the components are generally resistors, capacitors, diodes and transistors. Fig. 1 shows some typical modules. Various combinations of these components will perform many electronic functions. The components may vary in size, and the number required to perform a function may vary. It is frequently appropriate to perform several electronic functions with one module. When the

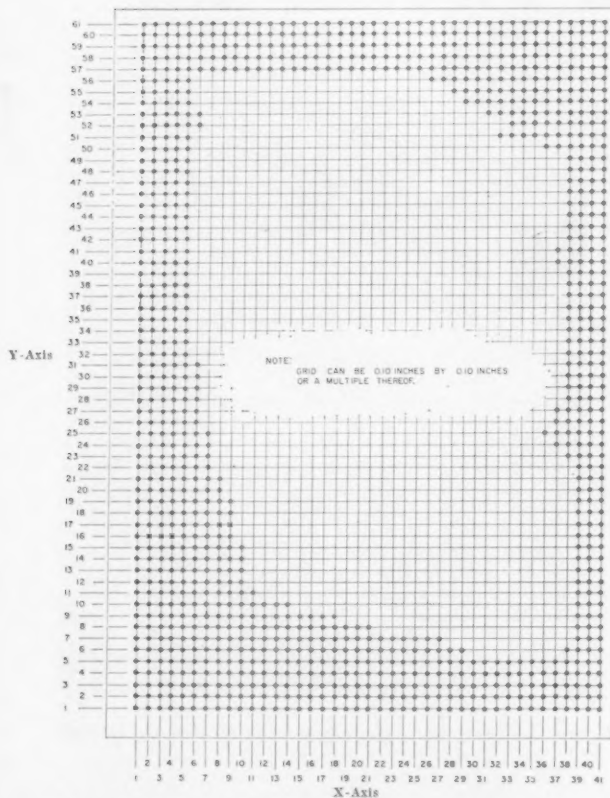


Figure 6—Method of coding component positions.

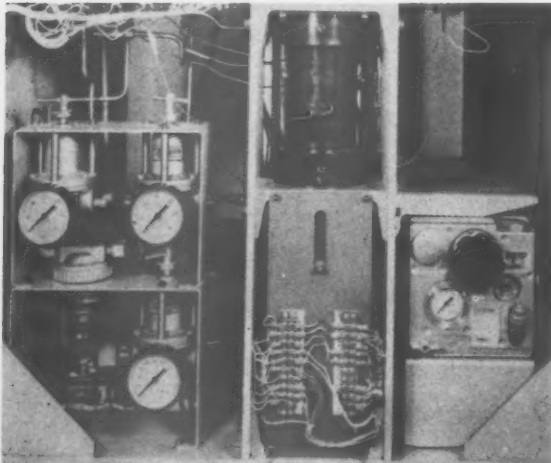


Figure 7—Power unit used with the card control system.

module performs a mechanical function, the basic design considerations given to electronic equipment are equally applicable.

The use of a grid to locate components eliminates the use of dimensions and tolerances. The grid has influence over the design of the components which will be mounted on the base. If two or more holes are needed to retain the component it is obvious that the grid controls the location of them. The grid compels the design engineer to locate the components by a standardized procedure. However, the grid does not stifle the ingenuity of the engineer in the creation and development of new functional units. This type of standardization is in fact an aid to him, because it simplifies the design process.

The components which are to become a part of the modular assembly need special design considerations, particularly if they are to be assembled to a base by mechanized means. For mechanized assembly components must be stored in magazines, hoppers, reels, or some other suitable means. Next they must be fed into the assembly equipment, and finally, they must be assembled. The component must have a built-in configuration that permits complete control of it from the time it is waiting to be fed into the system to the final operation of assembling it to the base. When electronic components such as resistors and capacitors have axial leads, their configuration makes them most suitable for mechanized assembly. They can be magazined or taped and can be reliably controlled in machine operation. If improperly designed, components can become extremely difficult to handle and control, especially if they are difficult to magazine or to orient properly at the assembly operation. Therefore, much consideration must be given to basic component design.

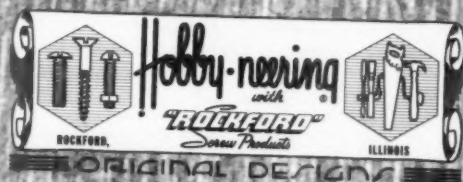
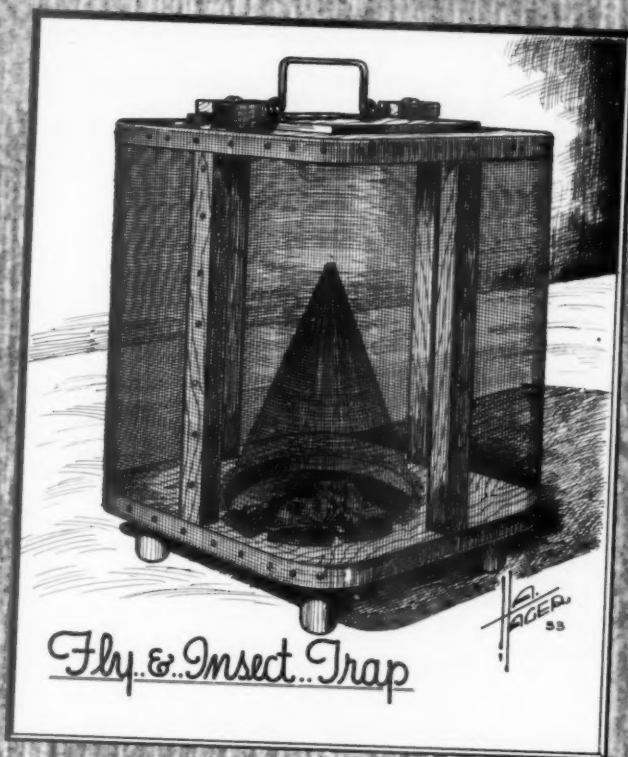
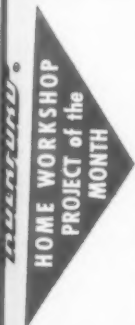
It will be observed that with a standardized grid plus proper component design, the design engineer is compelled to build experimental and preproduction units in conformity with the actual production techniques which will eventually be employed. As a result, very little methodizing remains to be done when the drawings are released to the production department. Briefly, the work of the methods engineer consists of checking the manufacturing drawings and scheduling them for production operations. He must determine the feasibility of each operation and the capability of his machines to meet all dimensional requirements. Methodizing is a costly and time-consuming phase of work, and the elimination of it in whole, or in part, is extremely desirable, providing that most of this work can be accomplished during the design phase.

BASIC DESIGN FOR MECHANIZED ASSEMBLY

A mechanized assembling system can be considered the equivalent of five basic or fundamental units as follows: (1) component feeding unit; (2) positioning unit; (3) assembling unit; (4) power unit; (5) control unit.

The Component Feeding Unit generally has two functions to perform: (a) It stores the components, and (b) it brings them to the assembly position. It

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JULY 1960

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LOWE'S

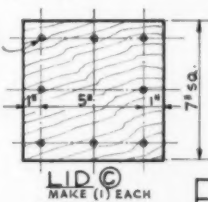
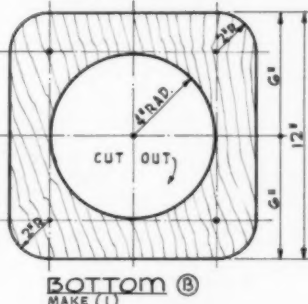
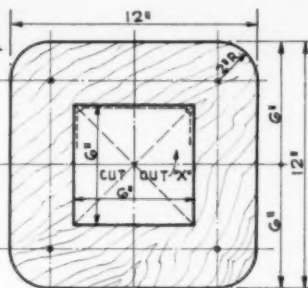
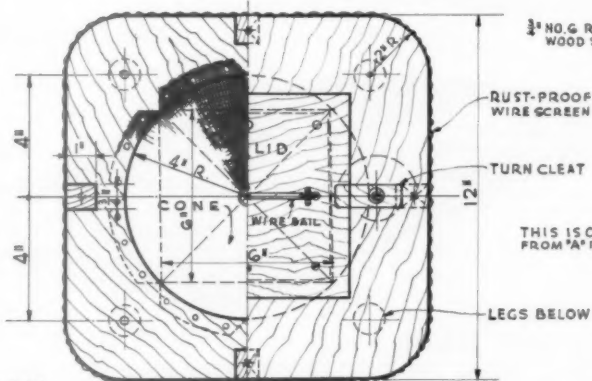
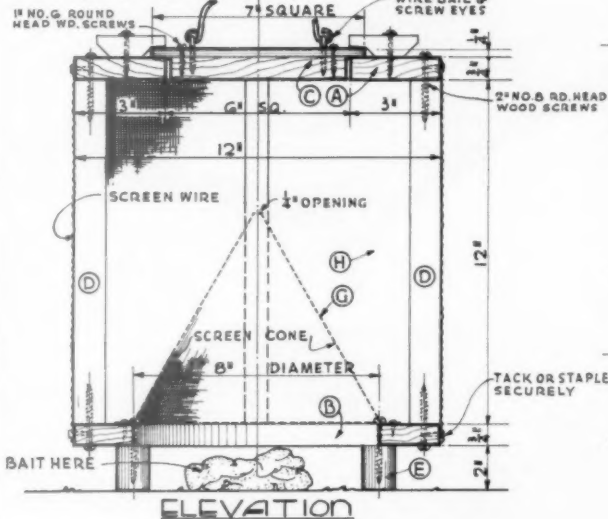
HOME WORKSHOP
PROJECT of the
MONTH



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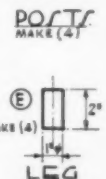
Fly and Insect Trap

SCALE: INCHES
0 1 2 3 4 5 6 7 8 9 10 11 12

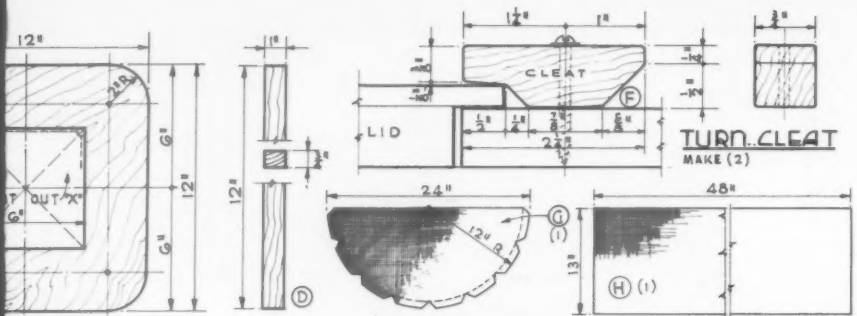


BILL OF MATERIALS

2 PCS.	3/4" x 12" x 12"	"A" & "B"	12 2
1 PC.	1/4" x 7" x 7"	"C"	8 1
4 PCS.	3/4" x 1" x 12"	"D"	2 1
4 "	1" x 1" x 2"	"E"	2 1
2 "	3/4" x 3/4" x 2 1/4"	"F"	2 1
1 PC.	12" x 24"	WIRE SCREEN	1 1
1 "	13" x 48"	" "	" "



WHERE... METHODS... NUMBERS... OUT FLIES... THEM FROM... ALL WE S... THE E...
MAKES OPERATION... SELVES. AN OLD SUCCESS... AND EASY TO BUILD... REQUIRED TO BUILD &... INSTITUTIONS, CAMPS...
● A DEAD FLY CAN'T... GENERATION BY MILL... LUMBER, RUST-PROOF... WHITE ENAMEL.
● LOCATE TRAPS... CANS, BARN, OUT-BUILDING...
● USE A PIECE OF... FLIES DESTROY THEM... PLEASE PASS IT ON TO... WHO IS INTERESTED.



POSTS
MAKE (4)

LEG
MAKE (4)

INSTRUCTIONS: ● FLIES, FLIES, EVERYWHERE... SPREADING SICKNESS & DISEASE, YET WITH ALL METHODS OF ERADICATION FLIES SEEM TO SURVIVE IN GREAT NUMBERS. FOR OUR OWN HEALTH & PROTECTION, SCREENING OUT FLIES OF OUR HOMES IS NOT ENOUGH... WE MUST PREVENT THEM FROM MULTIPLYING. THE ONLY SURE WAY IS TO DESTROY ALL WE SEE.

● THE EASY POSITIVE WAY IS EFFICIENT TRAPPING, WHICH MAKES OPERATION ALMOST AUTOMATIC, SINCE FLIES ELIMINATE THEMSELVES. AN OLD SUCCESSFUL PRINCIPLE IS USED IN DESIGNING THIS TIMELY AND EASY TO BUILD PROJECT. NO POISON OR EXPENSIVE MATERIALS REQUIRED TO BUILD & OPERATE TRAP. CAN BE USED AROUND HOMES, FARMS, INSTITUTIONS, CAMPS AND IN FACT ANY PLACE WHERE FLIES ARE PRESENT.

● A DEAD FLY CAN'T MULTIPLY... KILL THEM NOW AND REDUCE THE NEXT GENERATION BY MILLIONS. START BUILDING TRAPS NOW OUT OF SCRAP LUMBER, RUST-PROOF SCREEN WIRE, "ROCKFORD" WOOD SCREWS & A LITTLE WHITE ENAMEL.

● LOCATE TRAPS WHERE THEY WILL DO MOST GOOD; NEAR GARBAGE CANS, BARNS, OUT-BUILDINGS OR WHEREVER FLIES CONGREGATE.

● USE A PIECE OF FISH OR SPOILED MEAT FOR BAIT & WATCH THOSE FLIES DESTROY THEMSELVES. IF THIS PROJECT IS OF NO INTEREST TO YOU, PLEASE PASS IT ON TO BOY'S CLUB, MAINTENANCE DEP'T. OR SOME FRIEND WHO IS INTERESTED. *Thank You, Ray.*

(A)

(B)

(C)

(D)

(E)

(F)

(G)

(H)

(I)

(J)

(K)

(L)

(M)

(N)

(O)

(P)

(Q)

(R)

(S)

(T)

(U)

(V)

(W)

(X)

(Y)

(Z)

BILL OF MATERIALS			
2 PCS.	3/4" x 12" x 12"	"A"	"B"
1 PC.	1/4" x 7" x 7"	"C"	
4 PCS.	3/4" x 1" x 12"	"D"	
4 "	1/8" OR 1/16" x 2"	"E"	
2 "	3/4" x 3/4" x 2 1/4"	"F"	
1 PC.	12" x 24" WIRE SCREEN		
1 "	13" x 48" "		
		"ROCKFORD" Wood Screws	
		12 2" NO. 8 ROUND HEAD	
		8 1 1/2" NO. 6 "	
		2 1 1/2" NO. 8 "	
		2 SCREW EYES	
		1 WIRE BAIL	

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SERIES.. NO. 10

PROJECT
5
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- Deluxe Charcoal Bar-b-que
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is an integrated unit and should be designed as such. Some typical methods of component feeding are illustrated in Fig. 2. Many component hoppers for storage are commercially available and can be readily purchased on the open market. However, they must frequently be designed to meet special requirements of unique components. In the case of axial-loaded electronic components, which are relatively easy to store and handle, there are several preferred methods of storing them such as in magazines, or on reels where the components are attached to the surface of tacky tape.

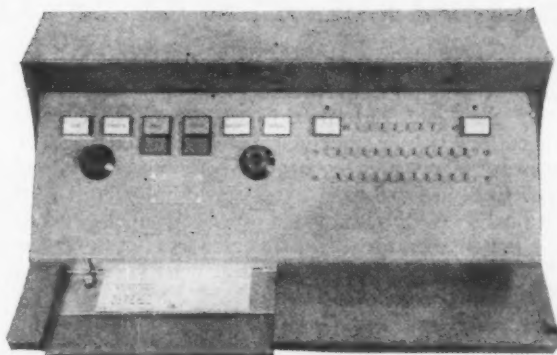
Bringing the components from the storage unit to the assembling position can involve many problems which are sometimes difficult to resolve. Among the simplest types of components to store and handle are those which are punched and formed but remain on the strip of material from which they were made. Assembling electronic components adds a degree of complexity, because they must first be selected from any one of a number of storage units and then fed into the machine by a common carrier. An air track, shown in Fig. 3, has functioned successfully for this purpose. The air jets bring the components to the assembly position very rapidly.

Obtaining proper orientation of the component at the assembly position can become one of the most difficult problems in component handling, particularly if the component is small and fragile. It takes much ingenuity and perseverance to solve these problems. The solution must make use of simple and reliable mechanisms. Malfunctions cause costly down-time of mechanized equipment.

One approach to an automated positioning unit has consisted of a carrier for the printed boards mounted on slides to provide movement in both the X and Y-axis. The slides are actuated by an air servomotor for each axis. A sectional view of the air servomotor is shown in Fig. 4.

The air servomotor is a patented device developed and designed specifically for the Mini-Mech system which assembles electronic components to a printed board. This servosystem possesses excellent accelerating and decelerating characteristics and practically eliminates "hunting." The motor, as shown, has seven exhaust ports which correspond to seven positions; however, any number of ports could be incorporated to meet the requirements of the grid. The two input ports provide a common air pressure to both sides of the piston. When the exhaust ports are closed, the piston remains stationary. It remains stationary until a selected exhaust port is opened to create a pressure differential which moves the piston in the direction of the open port until it is closed by the piston. The width of the piston is slightly greater than the diameter of the ports.

Exhaust air from the servomotor is utilized to operate a switch which controls a second piston (not shown) fitted with a tapered pin. When actuated, this piston drives the pin into a stationary tapered hole resulting in precise positioning of the carrier. Positioning can actually be as precise as the jig bores can machine the tapered holes. It should also be noted that the tapered pin will hold the work



Figures 8 & 9—A typical card reader and control key-board is shown above; a typical punched card below.

COMPONENT	COMPONENT	PART NO.	CARD NO.
A	D	1	JOB NO.:
B	E	2	ASSY. NO.:
C	F	3	NEXT ASSY. NO.:
		4	

DO NOT FOLD

PROJECT "MINI-MECH" MELPAR, INC. 2000 ARLINGTON BLVD. FALLS CHURCH, VA.

firmly enough to perform almost any kind of a machine operation.

Circuit-board feeding is accomplished by the positioning unit. The printed-circuit boards are stored in a hopper such as the one in Fig. 5. When the assembly of the components to a board is completed, the positioning carrier returns to the hopper for a new board. As this new board is fed into the proper position, it ejects the completed board and a new cycle of component insertion begins. The circuit-board hopper can be adjusted in width to accept a full range of board sizes as determined during the module design phase.

The Positioning Unit performs two functions: It locates the component with reference to the assembling or operational tool, and it picks up a new board from the storage hopper and simultaneously ejects the old board from the board carrier. In manually-operated machines the operator places the component against simple stops; when the machine cycle has been completed the operator removes the component. The stops are generally manually adjustable and require considerable setting-up time.

The considerations associated with the positioning of module components on printed board or base plates usually begin after the smallest and largest boards have been determined. If it can be assumed that a printed board or a base plate will be used to carry the components, all possible positions of them should be determined. A standardized grid will usually provide the most expeditious means for locating the components. Melpar started using a 0.10-in. grid for locating components on printed boards in 1951. This grid was applied to its automated Mini-Mech system.

There are several benefits derived from the use

continued

Design for Mechanized Assembly, continued

of a standardized grid; these will become apparent in the following dissertation. They begin at the design phase and continue through the manufacturing operations which produce the end product. The establishment of a basic grid is a step which will facilitate the operation of the positioning unit particularly. A typical grid for locating electronic components on printed wiring board is shown in Fig. 6. The dotted intersections shown in this grid represent the possible locations for the components. The dotted intersections show the over-all capability which must be designed into the equipment. The positioning mechanisms must obviously be built to meet the grid requirements.

The Assembling Unit for mechanized assembly can be similar to many existing machines which are manually operated. Actually this unit does not exclusively need to be an assembling machine. Its function may just as well be that of punching, forming, cutting, embossing, or any one of many other conventional operations. The machines generally perform a special operation, or a combination of two or more operations. They frequently require an operator to place a part into the machine and then remove it after an operating cycle has been completed. Some machines mechanically feed strip material from reels; this permits the operator to divide his time among several machines.

There is one rule which experienced design engineers prefer to apply in the design of mechanized equipment. They prefer to avoid a combination of operations such as cutting and assembling, or cement applying and assembling; chips or cement drippings can ruin an otherwise reliable assembling operation.

The Power Unit associated with a punched-card-controlled system consists mainly of air-reduction valve and filters, Fig. 7. The use of air as an actuat-

ing means has proven highly successful for this type of equipment. An air pressure supply to the equipment of 90 to 110 psi is recommended mainly because it is generally available at most factories.

The Control Unit can provide complete automatic control of a mechanized system of assembly. This control can be accomplished through the use of a program reader and a keyboard to manually select components and component positions. It also can have switches for power, heat, automatic, manual, start and stop. Fig. 8 shows a typical control unit. Such a unit can be built into the assembling equipment, or can be a separate unit, and can be used to control more than one piece of equipment.

The use of electronic controls has done much to revolutionize and advance the technology of mechanized equipment. It has eliminated most of the laborious manual control of the work. It has provided a means for obtaining greater precision with controlled uniformity in the manufacture of the end product. It has eliminated much of the intricate and costly mechanical linkages and cams, particularly where the machine required a number of motions timed with respect to one another.

One of the most important benefits resulting from electronic control is the ability to program for a large variety of work. Programming eliminates much of the manual adjusting of the machine. This reduces down-time and permits changeover for short runs.

Programming does not need to be a complex operation. In the case of an assembling system, it would consist of selecting a specific component and assembling it in a discrete position. The control unit reader would signal the selected magazine to feed its component to the assembling head, and another signal to the positioning unit would insure that the component is assembled in the proper place. The reader can obtain its information from a card or tape.

After the proper components have been loaded into the magazines, the operator places a punched card into the reader. Depressing the start key causes the cycle of assembling components to begin. After all components have been assembled, the card returns to the start position automatically until the production run has been completed.

There are several ways of storing information to program and control mechanized equipment. Among them are punched cards, punched endless tape, and magnetic tape. Much of this type of equipment is available commercially. We will not attempt to discuss the various types of coding which can be employed. The subject of information theory is a very complex one. We will, however, show how a binary code can be used to control a mechanized system.

A typical punched card is shown in Fig. 9. It will be observed that various combinations of punched holes are utilized to signal grid positions and components. The last signal from the card is used to recycle the whole operation. Sensing pins in a card reader send a signal through a system of relays which can, as in the case of the air servomotor, open any desired exhaust port to actuate the motor. By the same means the card reader sends a signal to a selected component magazine or hopper.

continued

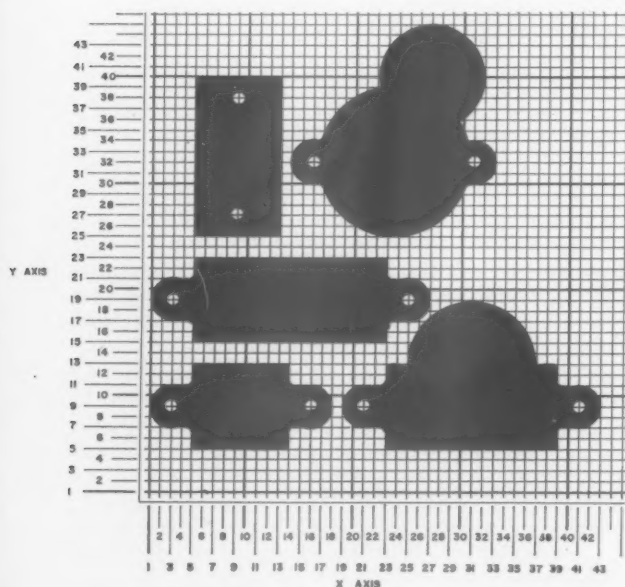


Figure 10—Sketch eliminates need for formal drawings.

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Design for Mechanized Assembly, continued

It should be noted that activities within the machine cycle can be protected by interlock switches to prevent repeating and jamming. For example, a photocell can be used to indicate that a component has reached the assembly position; it then signals the assembling tool to begin its downward motion. As a general rule, interlock switches are used to stop the equipment where malfunctions are anticipated.

Mechanized equipment is not necessarily limited to the production of "long runs" only. In many applications punch-card control is equally feasible for "short-runs." Punch-card control for short runs becomes feasible when there is an appreciable cost savings at changeover.

The application of modular packaging techniques has opened a new field of advanced technology. The benefits derived from this technology begin at the design phase and continue through the production operations. The prime objectives are to obtain increased reliability and economic savings.

Modular packaging techniques require much standardization; however, this standardization does not stifle the design engineer's ingenuity or his ability to create. The use of building blocks, or modular construction, in the electronic industry has become widespread because of the benefits which have resulted. Benefits in many other fields of engineering are equally potential.

For example, one of the benefits from the use of the grid is that it permits the engineer to draw a full-size sketch of the assembly on 0.10-in. by 0.10-in. cross-sectioned paper, as shown in Fig. 10. He can locate components on selected intersections. He can use a drill jig to drill the holes in the grid positions he has selected. He can assemble the components, and when he has completed this he can test the unit for functional performance. He has expeditiously obtained a breadboard which can also be tested to determine if it meets the environmental requirements. This design phase has been accomplished with a minimum amount of drafting time. The drill jig eliminated costly and time-consuming shop labor. It eliminated the need for drawings calling out hole locations and the tolerances which are always associated with every dimension. All that was necessary in lieu of the use of dimensions was a tabulation of selected holes on the X and Y-axes.

Mechanizing the assembly of modular components can be equally simplified if the modules are engineered for machine processing. Random design of modules with no orderly interrelationship among them will result in high production costs by eliminating the possibility of economically mechanizing the operations.

Capital investment in mechanized equipment can be costly. This phase must be carefully investigated and evaluated. The "break-even" point between manual and mechanized production methods generally determines the feasibility of the equipment. •

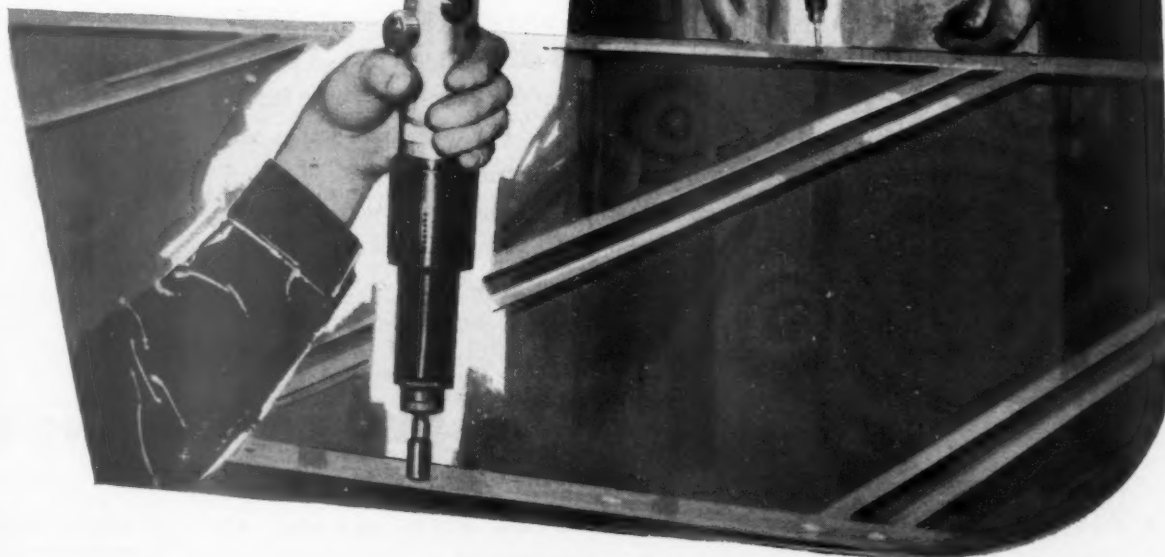
This article is based on a paper presented by the author before the Machine Design Division of the American Society of Mechanical Engineers, during the Design Engineering Show, in New York City, May 23-26.

Thor

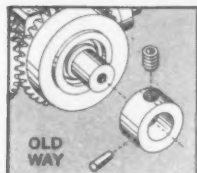
Everything you want in
Torque Control...

and more!

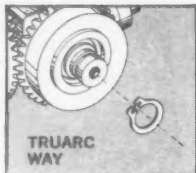
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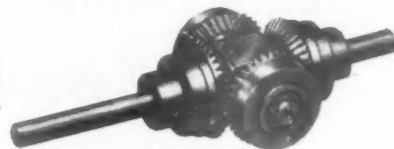


to

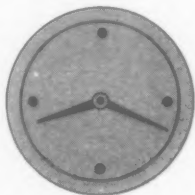


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by William F. McFee, Supervisor
Product Information Service
Armco Steel Corporation

Looking for a corrosion-resistant joint? Here are detailed instructions for alloy selection, fluxing, brazing procedure and cleaning.

SILVER BRAZING STAINLESS STEEL

Stainless steels may be silver brazed when welding is impractical. Silver brazing alloys, resistant to many types of corrosion, shock, vibration and temperature change, can be used to join stainless steels to plain steel, copper and other metals.

The brazing of stressed stainless steels with high melting point bronze rods is not recommended because of the danger of embrittlement caused by deep intergranular penetration of the brazing alloy.

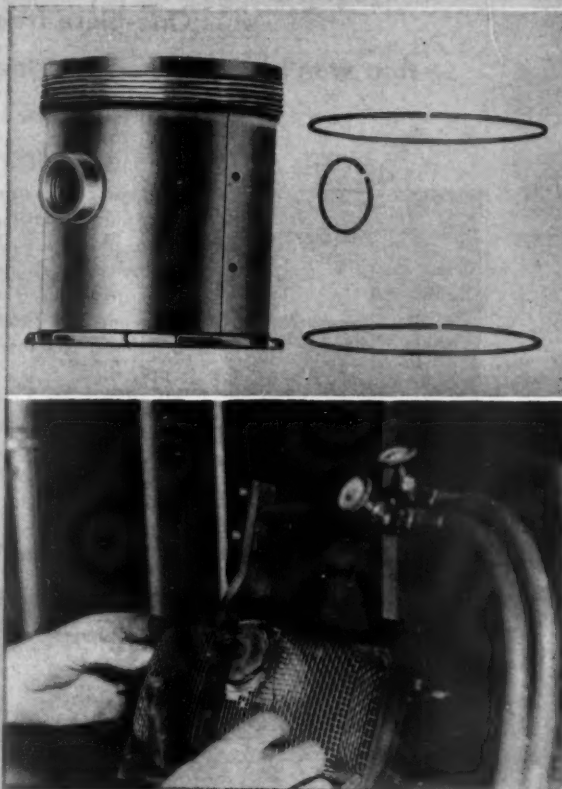
There are silver brazing alloys with melting points ranging as low as 1175 to 1600°F. For chromium-nickel stainless steels, select an alloy with a low melting point of about 1200°F. to minimize the heat-affected zone in the base metal.

Commercial silver brazing alloys that conform to these requirements are suitable for joining any grade of stainless steel. However, brazed joints in chromium grades which will be exposed to continuous high moisture, underwater or more severe conditions must be made with special nickel-bearing alloys. Any supplier of brazing alloy will recommend proper alloys and fluxes.

So far, no brazing alloy has been developed that will match perfectly the color of stainless steel. All silver brazing alloys tend to have a slightly yellow cast which deepens as the copper content of the alloy increases. For this reason low copper content is desirable. To conceal brazing as much as possible, use lap-type joints that expose only a thin film of the alloy. The finished joint should be buffed to improve the color match.

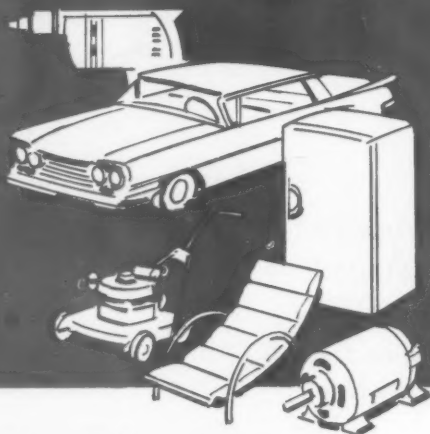
Borax and boric acid, often used as fluxes in high temperature brazing, are not suitable for low

continued



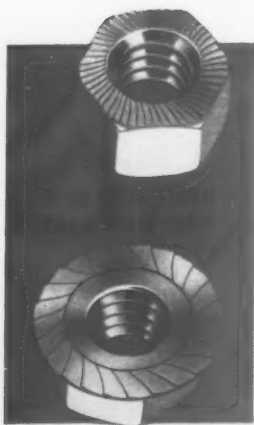
(Top) Three pre-formed rings of 1/32" silver alloy join stainless steel expansion valve spacer strip to brass fittings. (Bottom) A binding ring is silver brazed to a screen in a strainer for a carburetor scoop. A fixture rotates the work under the flame.

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Brazing Stainless Steel, continued

temperature silver alloy brazing. The most effective flux is generally the one developed by the manufacturers for the particular brazing alloy used.

The joint should be carefully cleaned of all oxides and dirt before brazing. Use a degreaser if the part has been in contact with oil or grease.

BRAZING PROCEDURE

Flux in paste form may be applied immediately after cleaning to the areas where the brazing alloy is to be applied. Suitable silver brazing alloy wire or strip is then fitted over the fluxed joint. An oxyacetylene torch adjusted to give a neutral to slightly reducing flame is generally used for heating, since it rapidly produces the necessary amount of heat. The joint is brought up to the brazing temperature evenly by playing the flame back and forth over the surface. Gas and electric furnaces with neutral atmospheres are often used on production work. The induction heating method has also proved effective. Furnace brazing with controlled atmospheres usually requires the use of some flux to remove the oxide film. The elimination of flux demands a non-contaminating reducing atmosphere of extremely low dew point.

PRE-PICKLING

During the fluxing and heating operation the surfaces of free-machining stainless steels become coated with a black scum. This hinders the flowing and wetting action of the brazing alloy. If the condition that causes this scum is not removed it will result in improperly bonded and weak joints. Pre-pickling the pieces to be brazed in a hot 20% nitric acid solution will help by removing the sulfide of selenide inclusions that are present at the surface of free-machining stainless steels.

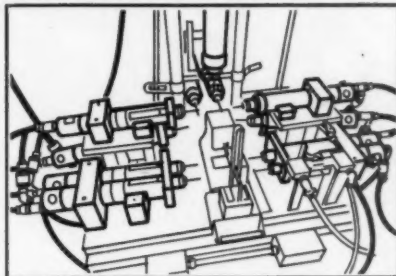
Immediately after silver brazing, all remaining flux should be completely removed with high-pressure steam or hot water. •

Assembly and Fastener Engineering

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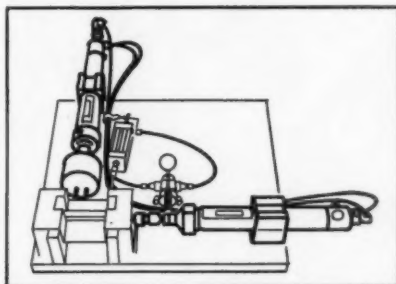
DRILL 3,000 per hour

Set up any number of Aro Self-Feed Drills in single fixture, then drill up to 3,000 holes per hour automatically. Capacities from $\frac{1}{16}$ " to $\frac{1}{2}$ " . . . speeds from 500 to 20,000 rpm . . . stroke lengths from $\frac{3}{8}$ " to 6". Use any combination of types and speeds, mount drills in any position.



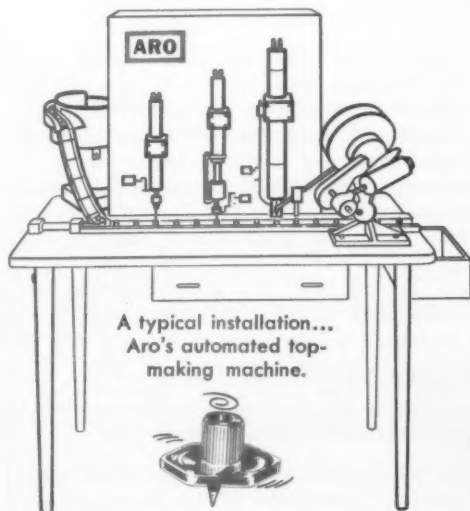
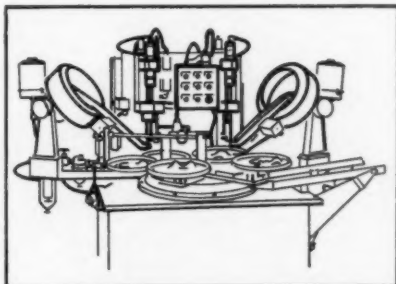
TAP 2,400 per hour

Combine your drilling and tapping operations in one fixture and eliminate costly handling. Aro Self-Feed Tappers have capacities up to $\frac{1}{4}$ "-20 in mild steel, or larger holes in softer materials. Speeds of 500, 900, 1,450 and 2,700 rpm. Stroke lengths up to $1\frac{1}{2}$ ". Accessories for precision depth.



FASTEN 3,000 per hour

Go automatic on your threaded-fastener operations with Aro Self-Feed Screwdrivers-Nutsetters. Standard range of speeds for the most commonly specified screw sizes. Uniform torque settings held within close limits. All models available with precision ball-type clutch.



A typical installation...
Aro's automated top-
making machine.

LET ARO TELL YOU HOW —

Without obligation, give us brief details of any drilling, tapping or fastening job which you would like to automate . . . your blueprint would be helpful. We will send our recommendations or have a representative call on you.



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THE ARO EQUIPMENT CORPORATION, Bryan, Ohio
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Three Simple Steps In . . .

SELECTION OF FASTENERS

Too often the approach to fastener selection varies from a nonchalant "anything will do" to an extra-rigorous analysis that leads to bins full of many types and sizes up and down the assembly line, according to fastener engineers at Russell, Burdsall & Ward Bolt and Nut Company. A better approach to fastener selection would be to use fewer types and sizes, correctly applied.

Three steps recommended by RB&W technical advisors to follow in fastener selection, especially standard fasteners, are:

1. Determine the clamping force required for the application.
2. Determine the material and diameter of the fastener that will supply the clamping force calculated most economically.
3. Determine the tightening torque that will create the correct clamping force in the assembly.

Steps one and two are designed to avoid both the nonchalant and the over-rigorous approach to fastener selection. By working from the clamping force required, the design engineer can stay in the realm of the physical requirements necessary to do the job, rather than wandering into a maze of chemical specifications of materials.

Except where temperature, corrosion or weight problems demand that the chemical characteristics of the fastener material be spelled out, the engineer is better off to stick with the physical requirements. By staying with the physical requirements, he is in a better position to simplify his design approach. Often he can standardize on one grade of fastener material, rather than using SAE Grades 2, 5 and 8 fasteners (as has happened) all in the same assembly.

Having determined the correct clamping force needed, the designer must go on to specify the tightening torque required in the assembly. Unless this last step is following, the holder power specified and purchased may never be put to work.

A bolted connection with $\frac{5}{8}$ inch diameter Grade 5 bolts torqued to a low level of 75 foot-pounds is weaker than the same joint bolted with $\frac{1}{2}$ inch Grade 5 bolts torqued to their proper level of 85 foot-pounds. Giving assembly and inspection personnel a benchmark to guide them will help insure that the fasteners selected are doing the job required, say the technical advisers. •

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and setting with**

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You'll realize *faster assembly . . . reduced labor costs* immediately, when you use T-J Rivitors and Clinchors for your production line. These performance-proved machines are designed to do a wide range of assembly jobs for aircraft, automotive, farm machinery—riveting jobs of *all* kinds.

T-J RIVITORS automatically feed and set solid rivets with high production. Electrically powered Rivitor sets solid steel rivets up to $\frac{7}{8}$ " long. Throat depths 8" to 36".

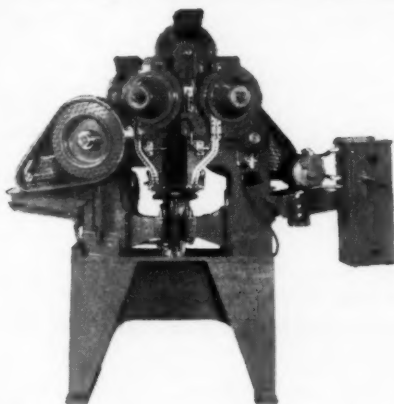
T-J CLINCHORS set clinch nuts with fully automatic operation, controlled by a single foot pedal. Available in Underfeed and Gravity Feed models, throat depths 8" to 36".

Send today for these helpful references: Rivitor bulletins 646 and 555 . . . Clinchor bulletin 555. The Tomkins-Johnson Co., Jackson, Mich.

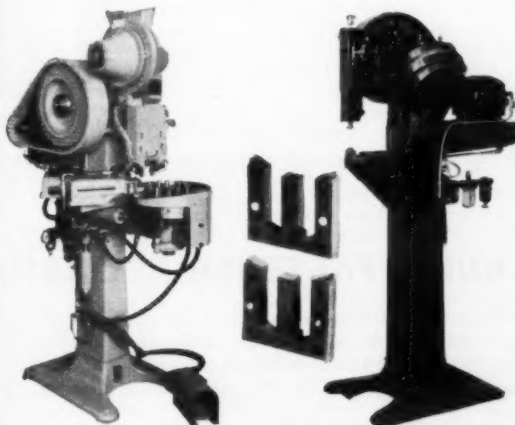
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RIVITORS AIR AND HYDRAULIC CYLINDERS CUTTERS CLINCHORS



RIVETS 4 AT A TIME! Special quadruple riveting unit, incorporating two Model "RR" Twin Rivitors, mounted on a special welded steel base. Equipped with air-operated hold down mechanism and a safety air trip arrangement. Tooled for riveting left hand and right hand automotive muffler bracket assemblies.



SPECIAL TWIN RIVITOR! Tooled for 6 station indexing fixture, incorporating automatic clamping and ejecting mechanisms, for riveting laminated armature assemblies.

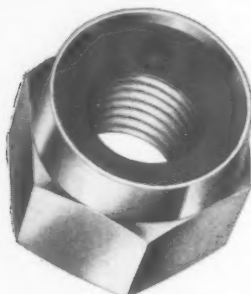
T-J CLINCHOR adapted to a wide range of clinch nut setting problems. Gravity Feed model shown here.

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UNSHAKEABLE SELF-LOCKING PERFORMANCE IS BUILT INTO AN ELASTIC STOP NUT



*Start with a standard hex nut
and add a metal crown . . .*



*Add "the ring **O** of reliability"—
the easily identified ESNA red nylon locking insert . . .*



*Then roll the crown over smoothly and stake—
the insert is made an integral part of the Elastic Stop nut*

BUILD FASTENER RELIABILITY INTO YOUR PRODUCT!

Take an Elastic Stop nut and mount it on one of your products where vibration is really severe. Shake the daylights out of it in the roughest torture test you can devise—or better still—send it into the field where it's subject to regular use and abuse.

Here's what you'll find: That Elastic Stop nut will stay put! The bolt threads are impressed into the nylon locking collar with such a perfect fit that internal liquid seepage is sealed off. Internal nut and bolt threads are protected against corrosion. The nylon insert locking torque is so smooth that it never galls or distorts bolt threads; and nylon is so wear-resistant that under normal usage *you can wrench*

the nut on and off the bolt 50 times or more and the nut will still remain tight under vibration! Protect the performance and the reputation of your product by guaranteeing fastener reliability. Try it yourself and see. Send for free test samples. Just tell us the size. Dept. S53-797, Elastic Stop Nut Corporation of America, 2330 Vauxhall Road, Union, New Jersey.



**ELASTIC STOP NUT
CORPORATION OF AMERICA**

WHAT'S NEW IN EQUIPMENT

For information on any equipment listed here, use the postpaid card opposite page 66. Just circle the number on the card matching the number following the description. We'll do the rest.



(See 1)

POCKET TOOL DRIVES VARIETY OF SCREWS, NUTS

A four-way pocket tool, Model 1600, is readily adaptable to fit a variety of nuts, bolts and screws. A sturdy pocket clip is provided.

The red plastic handle features a 1/4" socket at one end with a 7/16" socket at the opposite end for driving hex nuts, bolts, and screws. The double-end blade is inserted in the 7/16" socket to convert the tool to either a 3/16" slotted or a No. 1 Phillips screwdriver. A spring holds it firm.

Xcelite, Inc., Orchard Park, N.Y.

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(See 2)

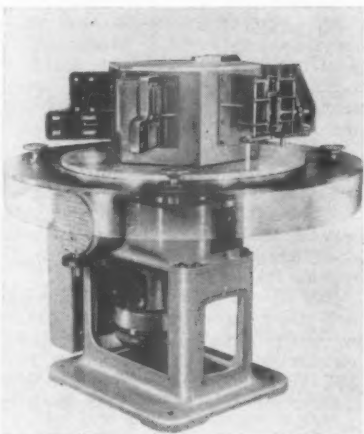
WELDING HEAD FOR ELECTRONIC ASSEMBLY

Model 1037 bench-mounted welding head features twin ball-bearing races for precise control over the placement of the weld. This ball-race vertical-action design permits perfect linear movement of the upper electrode, completely eliminating electrode wiping action as pre-set electrode pressure, variable from 2 to 50 lbs. is applied to fine wire leads and other critical applications.

Plug-in interconnectors permit the unit to be set up with any Weldmatic stored-energy power supply. Versatility is increased by the use of interchangeable electrodes of various configurations and materials, including roller-type electrodes for seam welding. Electrode pressure is adjustable and exactly repeatable by a single knob control. Swing-type foot pedal with 5:1 mechanical advantage actuates the upper electrode arm.

Weldmatic Division, Unitek Corp., 950 Royal Oaks Dr., Monrovia, Calif.

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(See 5)

NO FLUX NEEDED WITH ULTRASONIC SOLDERING

An eight-ounce, 10-watt ultrasonic soldering iron is capable of soldering a wide range of materials without flux.

The S-10 is designed for soldering semiconductor materials, as well as

aluminum, magnesium and their alloys, especially those characterized by rapid surface oxidation. The unit eliminates surface pre-treatment as well as post-cleaning to remove flux.

Operating on normal 115-volt, 60-cycle power, the iron's use can be taught unskilled workers in a matter of minutes.

Gulton Industries, Inc., 212 Durham Ave., Metuchen, N.J.

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ADD NEW SIZES TO LINE OF PIPE TAP EXTENSIONS

Style B tap extensions are now available to fit pipe taps from 1/16" through 1/2". The 8" extensions make possible either machine or hand tapping of otherwise inaccessible holes.

The squared shank of the tap fits into a corresponding square in the socket of the extension. The tap, supported by the close fitting long socket of the extension, is held by two socket set screws 90° apart which bear on the square of the tap.

The Walton Co., Box 5, Elmwood Branch, Hartford 10, Conn.

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ASSEMBLY MACHINE WITH INTEGRAL PARTS PLACING

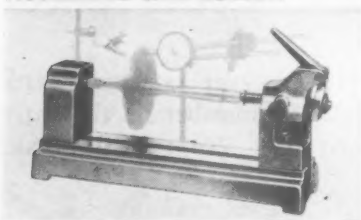
A standard machine is furnished complete with parts placing motions at work nests on the indexing dial. The user employs the "machine tool concept" of adding holders and collets or other devices which are designed to hold and handle his product parts as he would apply special cutting tools and work holding fixtures to a production mill or screw machine. Where a similarity between sizes of parts and assembly methods exists, it is only necessary to attach new holding devices when setting up for a change-over in production.

Typical of the new assembly machine tool is this rotary transfer machine with a 12-stop, 36" diameter dial. Each of six integral parts placing stations, actuated by cams operating at the dial

center and powered from a right angle drive mounted to an extension of the index table input shaft, serves two positions. Allowing one pair of stations for ejection of complete assemblies, the double tooled machine can produce 120 five-part assemblies a minute while operating at a cyclic rate of 60 per minute.

Ferguson Machine Corp., 7818 Maplewood Industrial Ct., St. Louis 17, Mo.
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BENCH CENTER FOR ASSEMBLY INSPECTION

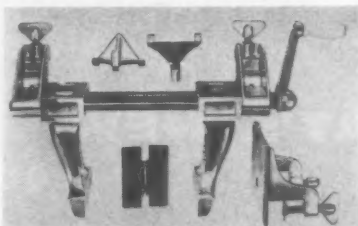


A bench center for production line inspection can be used for inspection of machined parts, stampings, assemblies. The unit is adjustable from 0" to 10" maximum, has a fixed removable head center and a locking quick spring travel on the tail stock center. Of Meehanite cast construction, the center is designed to use all standard indicator rods and attachments.

Quality Gage Co., 968 E. 69 Pl., Cleveland, Ohio

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SHOP VISE ADAPTABLE TO ALL SIZES OF WORK



A light, tempered metal vise has revolving jaws and an auxiliary clamp which allows the working of hex, octagonal, oval or round objects in desired dimensions.

The Little Wonder Zylyss vise has a low draw screw providing a jaw opening up to 8". The auxiliary clamp permits the clamping of boards regardless of lengths. By removing the auxiliary clamp the vise can be used as a C-clamp.

Little Wonder, Inc., Southampton, Pennsylvania.

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SMALL BENCH WELDER CONTROL FOR ELECTRONICS

A new midget bench welder control for resistance welding weighs only 21 pounds—measures 6" wide, 10" deep and stands 10" high.

It is designed primarily for the electronic tube industry where conservation

of working room and power distribution sources is vital to efficient production methods. It can also be applied in many areas of the art metal industry.

Robotron Corp., 21303 W. 8 Mile Rd., Detroit 41, Mich.

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LUBRICANT BRUSH NOW BUILT INTO PLASTIC JAR



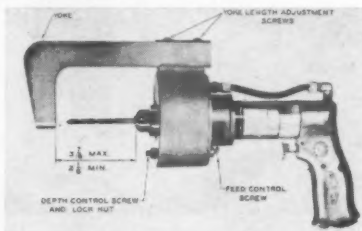
Plastic jars of Molykote G lubricant now have applicator brushes built into the cover to prevent brush contamination. A protected well in the center of the jar stores the brush when the cap is replaced.

The compound is used for reducing galling, seizing and metal pick-up on threaded connections, press fittings, splines, gears, power screws and other friction and wear parts.

The Alpha-Molykote Corp., 65 Harvard Ave., Stamford, Conn.

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ATTACHMENT SPEEDS, CONTROLS DRILLING



A drill feed assist attaches to a No. 10 drill to provide precise depth control and speed drilling.

The unit basically is an air cylinder attachment that screws on the No. 10 drill in place of the chuck guard or bearing retainer. It is actuated when the drill trigger is depressed, along with the drill motor itself, and pulls the drill into the work.

As an example of the application, a field test resulted in the drilling of 1/4" holes in 1/2" thick 2024 aluminum plate at the rate of only three seconds each, compared to 15 seconds using a regular No. 10 drill.

Rate of feed can be set so the tool will either support itself while drilling or require some assist from the operator. The device is available in 500, 1500, 2000, 2700, 4000 and 5000 rpm models.

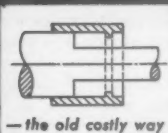
Cleco Air Tools, Box 2119, Houston 1, Texas.

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**INCREASE RUN-DOWN SPEED
ON 3/4" IMPACT WRENCH**



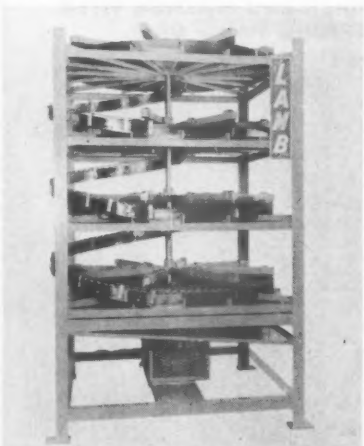
A 3/4" impact wrench has been re-designed with 91% faster run-down speed than its predecessor model. The 810 Impactool delivers 1000 impacts per minute, with a free speed of 4300 rpm.

Actually 2-5/16" shorter, the tool's direct drive between motor and hammer gives greater torque and speed in heavy-duty nut running. In addition to a 3/4" square drive, the unit is also available with 3, 6 or 8" extended anvils with a 3/4" square drive; and a 1" square drive or a quick change anvil with a 5/8" hex recess.

Ingersoll-Rand Co., 11 Broadway,
New York 4, N.Y.

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**UNIT STORES, FEEDS
UP TO 12,000 PARTS**



A storage-feeder unit with up to 12,000 parts capacity is designed to bank and/or feed parts in automatic parts handling installations. It maintains in-storage part orientation, first-in-first-out part sequence.

Standard units (floor or overhead suspended models) are comprised of from one to six storage decks which can be arranged to handle one or several different parts simultaneously. Each deck is a spiral track that can be wound into single or multiple part lanes. Parts enter at the outer diameter of the deck, travel through the spiral course to the center where they are

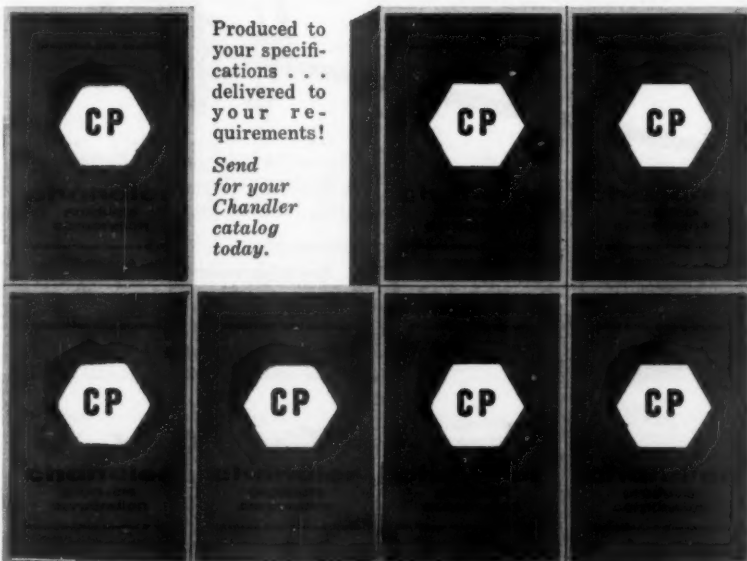


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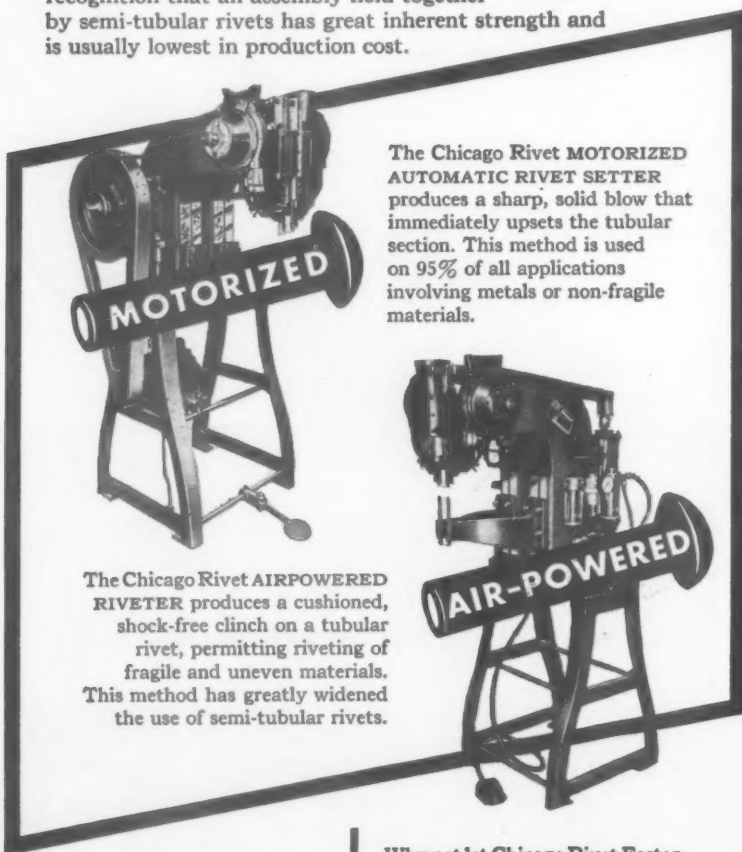
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Why *Chicago Rivet* Offers TWO METHODS for Clinching Semi-Tubular Rivets

It is part of a widening service based upon industry's recognition that an assembly held together by semi-tubular rivets has great inherent strength and is usually lowest in production cost.



The Chicago Rivet **MOTORIZED AUTOMATIC RIVET SETTER** produces a sharp, solid blow that immediately upsets the tubular section. This method is used on 95% of all applications involving metals or non-fragile materials.

The Chicago Rivet **AIRPOWERED RIVETER** produces a cushioned, shock-free clinch on a tubular rivet, permitting riveting of fragile and uneven materials. This method has greatly widened the use of semi-tubular rivets.

FOR YOUR FILES



RIVET CATALOG describes 1388 standard tubular and split rivets and 25 single and multiple motorized automatic rivet setters.



AIR-POWERED RIVETING catalog contains description and specifications of 8 single and multiple riveters—also rivet setters designed for automated operation.

Why not let Chicago Rivet Fastening Engineers tell you which system is best for you. No obligation.

MOTORIZED

Line includes automatic single, multiple and automated setters.

AIR-POWERED

Line includes automatic single, multiple and automated setters.

**Chicago Rivet
& MACHINE CO.**

946 So. 25th Ave., Bellwood, Ill.
(Chicago Suburb) Branch Factory:
Tyre, Pa.

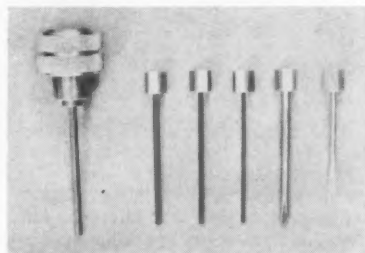
discharged to the next lower deck or to processing.

Input storage and output feed rate is adjustable up to 6000 parts per hour through pulley changes. The units are self-cleaning. Unit enclosure and drip pan available as optional features.

F. Jos. Lamb Co., 5663 E. Nine Mile Rd., Detroit 34, Mich.

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TORQUE WRENCH FOR PRECISION ASSEMBLIES



A torque wrench and screwdriver is designed for use with socket head cap screws from 0 to 1/4" and small slotted and Phillips head screws on miniature assemblies.

The wrench can be pre-set for specific torque requirements and is adjustable. Blades come in 3" lengths as standards; specials are available.

Techni-Tool Products, Inc., Dept. TW, 3860 W. Slauson Ave., Los Angeles, California.

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OPEN-END WRENCH WITH SPRING PAWL GRIP



Wrenchking's spring-activated pawl slides against the flat jaw of the wrench to seat the tool against the nut. It then locks the nut in the wrench; releases the nut for ratchet action, and relocks.

The wrench exceeds government torque specs for open-end wrenches. Made of SAE 4140 steel, the wrench is hardened to 48-51 Rockwell C and hard chrome plated.

The Bristol Co., Waterbury 20, Conn.

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assembly and fastener engineering

JULY, 1960

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WHEATON, ILLINOIS

Readers' Service Division

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WHEATON, ILLINOIS

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WORKBENCH STAND HOLDS 16 HEX KEY WRENCHES



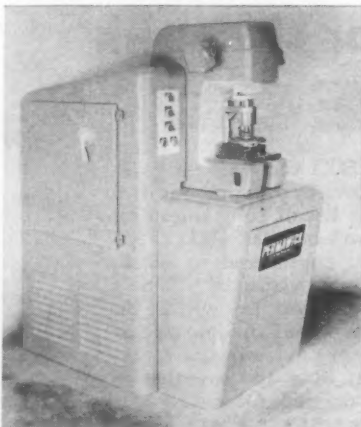
A metal workbench stand holds 16 hex keys to fit practically all hex socket screws except the very large diameters.

The No. 665 holds keys from size .028" through 1/2" (hex width across flats) which are individually held upright in the metal stand and immediately identified by a key-size chart on the front of the stand. Included are new 7/64" and 9/64" sizes for No. 6 and 8 '60 Series cap screws. Spaces are also provided in the base of the stand for three large keys (9/16", 5/8" and 3/4") not furnished with the set.

All keys are made from heat treated alloy steel.

The Allen Mfg. Co., Hartford, Conn.
Use postpaid card. Circle No. 13

AUTOMATED UNIT PRESS- FITS, RIVETS OR STAKES



A special machine press-fits, rivets or stakes complex assemblies and injects a measured portion of fluid wicking in a single operation.

Permapress was designed especially to automate the assembly and lubrication of end bells for fhp and integral motors up to 100 hp. It may also be used to assemble automobile distributors and other small wick-fed bearing assemblies. Capacity ranges up to 750 completed assemblies an hour.

July, 1960

**YOUR
PARTNER IN
AUTOMATION**

CENTRAL
Fasteneering
begins at the
blueprint stage... to
save on
assemblies!

Style 843

Style 842

Central KEPS Nuts present a practical example of how Central's "Fasteneering" service can simplify and improve your fastener designs, starting at the blueprint stage. More efficient fastening with less handling along assembly lines add up to substantial savings for users of Central Keps Nuts.

Write for Samples and Full Details

Prompt Deliveries from Central's 4 Complete Factory stocks

Style 844

Style 845

CENTRAL SCREW COMPANY

3503 SHIELDS AVE., CHICAGO 9, ILLINOIS
149 EMERALD ST., KEENE, N. H. • FRANKFORT, KY. • 2901 S. TANNER AVE., LOS ANGELES 21, CALIF.

Use postpaid card. Circle No. 245

Basic units may be either an A-frame press (pictured) or standard tubular rivet machines, modified by the addition of sensing switches, fixtures, wicking injector, electrical panel and indexing table.

Permawick Co., 5319 E. Outer Dr., Detroit 34, Mich.

Use postpaid card. Circle No. 16

DRAFTING TEMPLATE FOR METAL RETAINED SEALS



A pocket size drafting template made of semi-opaque, non-glare plastic has cut outs for pencil points duplicating the cross section pattern of Gask-O-Seals in twice and four times size for four different styles.

Actual size is printed in black above each style and can be traced if necessary. The template also carries dimensional and tolerance information. Free to engineers.

Parker Seal Co., 10567 Jefferson Blvd., Culver City, Calif.

Use postpaid card. Circle No. 17

TWIN ELECTRODE WELDING TORCH FOR AC WELDING



Model B-3 twin electrode torch is designed for any a.c. welding machine. It uses two cored carbon electrodes, is easily maintained at proper distance, to produce an electric arc for many heating, soldering, brazing, and welding jobs. Because no gas is involved, costly time consuming cylinder handling is eliminated.

Arcair Co., Box 431, Lancaster, Ohio.

Use postpaid card. Circle No. 18

SPOTWELDING IMPROVED BY ELECTRONIC CONTROLS

An electronic spotwelding control that utilizes digital and analog computer elements is now being manufactured on a production basis.

Employing the feedback principle, the Monautronic V-2 unit produces quality welds regardless of the actual in-process variables that may produce poor welds even with the best conventional controls.

Among the types of weld variables compensated for by the new control are: line voltage fluctuations, changes

in amount of applied electrode force, electrode wear, variations in surface finish, fitup, thickness or hardness of material; variations in amount of ferrous material in secondary circuit, contamination of metal surfaces, variations in horn and electrode lengths causing reactance changes, and proximity of other welds (shunting effect).

The control cannot — even under extreme conditions — produce a sub-standard weld without immediately "locking-out". It thus prevents the operator from continuing to weld until he has corrected the abnormal condition.

Electronic Controls Section, The Budd Co., 2450 Hunting Park Ave., Philadelphia 32, Pa.

Use postpaid card. Circle No. 19

PILOT PUNCHES REMOVE SPRING PINS



Pilot punches speed spring or roll pin removal and eliminate damage to pin or wall of holes. Also, the pin may be driven completely through the hole without sticking punch. Twelve sizes match all standard pin diameters and maximum lengths.

Mayhew Steel Products, Inc., Shelburne Falls, Mass.

Use postpaid card. Circle No. 20



GREAT NAMES IN INDUSTRY produce MORE for LESS with PEECO

The story at PEECO can best be paraphrased — "... known by the company they keep..." The long list of companies that now 'produce more', because PEECO vibratory feeders are engineered to work, reads like America's industrial "Who's Who". PEECO'S technical knowledge in parts feeding can help you schedule one or more parts at a given rendezvous at a pre-determined rate per hour and oriented to the exact position desired. Obviously this generates great savings. Let PEECO sales engineers help you 'produce more'. Send for new literature on the latest feeding technique.

PEECO FEEDS THEM ALL

VFC and PEECO are Divisions of
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TWO GREAT NAMES IN PARTS FEEDING

AUTOMATION DEVICES INC.

32nd and BRANDES STS., ERIE, PA. • PH. GL 6-5381



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Assembly and Fastener Engineering

**SPECIAL WRENCH DOES
FIVE JOBS IN ONE**

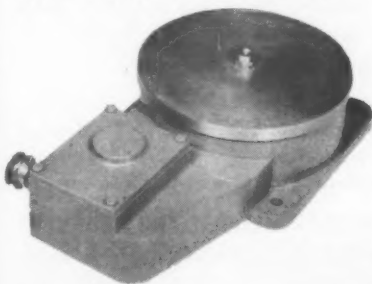


For servicing automobile air-conditioning units, a combination tool has wrench openings for all service valve stem and gauge port caps, plus a standard $\frac{1}{4}$ " reversible ratchet wrench. The Reeverench also provides for operating the $\frac{3}{8}$ " square refrigerant drum valve.

Milbar Corp., 1900 Euclid Ave., Cleveland 15, Ohio.

Use postpaid card. Circle No. 21

**ROTARY TABLES WITH SLOW,
START-STOP INDEX MOTION**



Rotary tables feature a slow start and slow stop on each index.

A 40-1 ratio on a worm gear drive rotates a cam which gives positive lock on 180° of the rotation and a smooth turning motion on the 180° of rotation. A crank drive from the cam activates an indexing pawl to give the slow start and stop motion.

Power is supplied by the choice of a fractional h.p. electric motor, rotary air or hydraulic motor.

Simplicity of design makes the unit easy to synchronize with other equipment. Indexing can be up to 5000 per hour with heavy fixture loads. The unit is available in 10" or 18" diameter table top.

Jackson Fluid Power Co., 16722 E. Warren Ave., Detroit 24, Mich.

Use postpaid card. Circle No. 22

Specify

**HUCK
FASTENERS**

for:

- FASTER, EASIER INSTALLATION
- GREATER STRENGTH
- UNIFORM TENSION
- MAXIMUM SHEAR STRENGTH
- PRECISION FIT
- LOWER INSTALLED COST

Huck permanent fasteners are available in many types, shapes and sizes, from $\frac{1}{8}$ " to $\frac{3}{4}$ " diameter, to meet the requirements of all types of manufacturing, from railroad cars, trailers, buses, ships, blowers, appliances, to farm equipment and prefab buildings. These and many other users specify Huck fasteners for reasons of economy, speed of application, strength and dependability. You too, may find the answer to faster, better, cost-cutting assembly by investigating Huck's advantages. Write for literature, or ask for a Huck Sales Engineer who will be glad to explain the advantages of Huck Fasteners in your product. No obligation.

CL—
Commercial
Huckbolt

DR—
Daisy
Blind Rivet

PT—
Pull-Thru
Blind Rivet

OS—
Oversize
Structural
Blind Rivet

MLS —
Mechanical
Lock Spindle
Blind Rivet

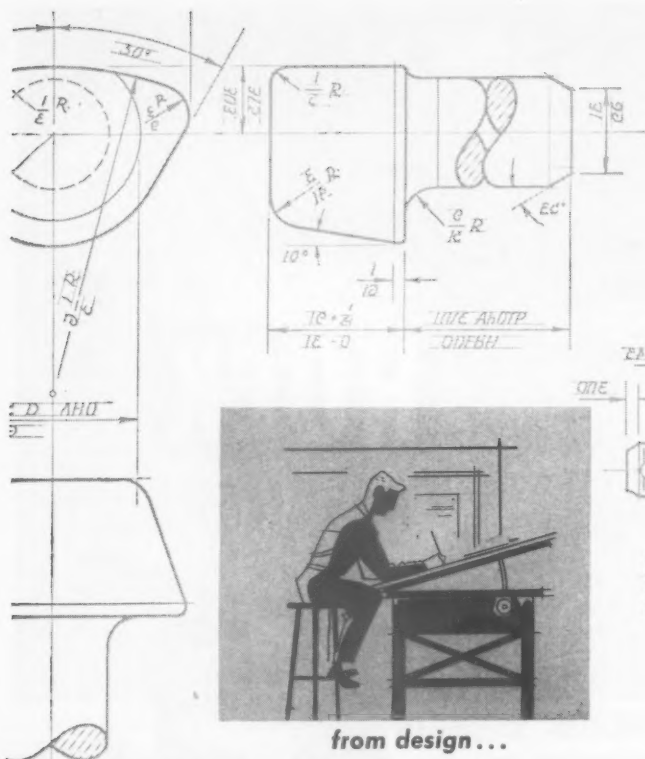
BL—
Blind
Huckbolt

HUCK

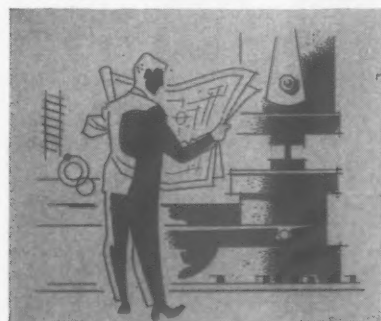
MANUFACTURING COMPANY

2480 Bellevue Avenue • Detroit 7, Michigan • Phone WA 3-4500

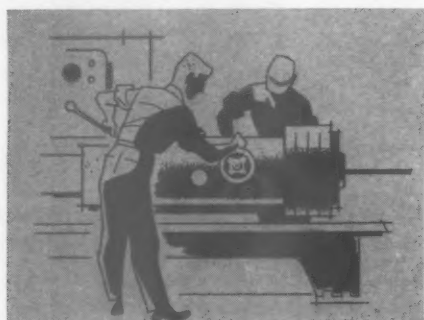
Use postpaid card. Circle No. 247



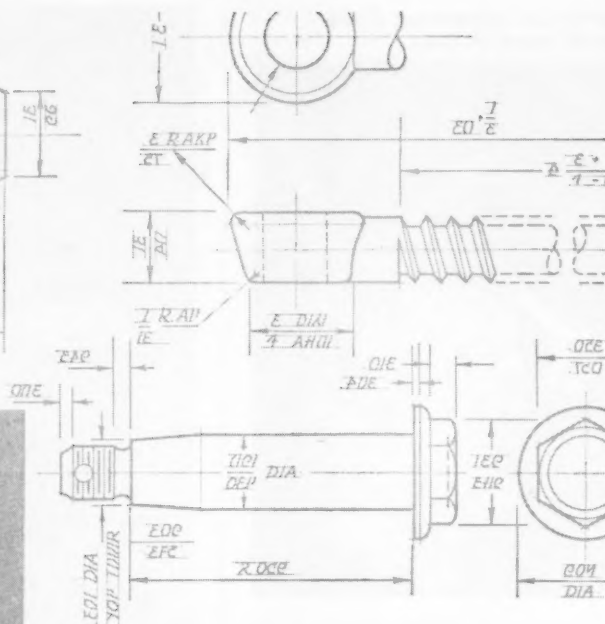
from design...



to engineering...



through production



rely on Republic for

FASTENER and FORMED PARTS "SPECIALS"

When standard fasteners or formed parts can't handle the job, count on Republic's Special Products Team. Tough design and production problems are their specialty. Your job is tackled with problem-solving know-how and experience.

CAN HANDLE COMPLETE JOB—OR A SINGLE PHASE

Republic will do the job the way that's best for you. (1) Completely design, engineer, and produce your "special"; (2) Make it from your blueprints, to your specifications; (3) or, produce blanks that are ready for your finish machining or special purpose cutting.

WIDE CAPABILITIES—MODERN METHODS AND EQUIPMENT

Republic produces "specials" in an infinite variety of shapes and sizes. Cold forming, hot forming, extruding, upsetting, (and combinations of these) methods are used. Complete machining, heat treating, and surface finishing facilities are also available. Result—single-source operation that cuts your costs—assures a top-notch job.

For complete information on Republic Fastener and Formed Parts "specials" write Dept. AS-9752, Republic Steel Corporation, 1441 Republic Bldg., Cleveland 1, Ohio.

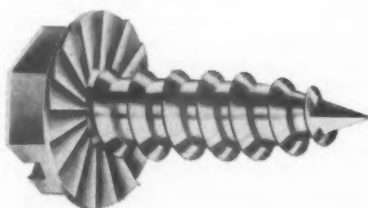


REPUBLIC STEEL

*World's Widest Range
of Standard Steels and Steel Products*

WHAT'S NEW IN FASTENING AND JOINING

For further information on any of the fasteners or methods listed here, use the handy postpaid card opposite page 66.



(See 25)

TAPPING SCREW DRILLS HOLE HAS INTEGRAL WASHER

A tapping screw eliminates hole punching or drilling of light gage sheet metal. Tapit also has an integral washer with a serrated face that acts as a built-in brake to minimize stripping and spinning.

The fasteners are designed to be used with a quarter-inch power screw driver with adjustable clutch. The manufacturer also supplies a magnetic driver socket that fits any standard power driver. Only one size socket is needed, since all sizes of Tapits, from No. 6 to No. 10, have the same size hex head.

Tapits have a cuniform (pyramid-type) point that starts drilling immediately, will not walk, skid or creep. Points are sharp.

Parker-Kalon, Clifton, N.J.
Use postpaid card. Circle No. 25



(See 26)



(See 28)

REVERSIBLE NUT WITH INTERNAL LOCKING RING

A reversible, self-locking nut will be available in all standard and commercial sizes in September. The J-Lok has an internal locking ring supplied for standard applications in either Delrin or Polypropylene, spring steel for high temperature requirements.

The reusable fastener can be used either side up for automatic assembly.

Jacobson Nut Mfg. Corp., Box 177, Kenilworth, N.J.

Use postpaid card. Circle No. 26

CONTAINER LATCH WITH 4500 LBS. TENSILE STRENGTH

A heavy duty latch is designed for rugged service on reusable containers, transit cases and large assemblies of components. The 37L has an ultimate tension and shear strength of 4500 pounds.

Two models are available, both having the same strength but differing in size: 5 1/4" and 3 3/8" in length. The 5 1/4" size has two drawhook pivot positions. One gives more mechanical advantage with less take-up, the other



(See 27)

more take-up and less mechanical advantage.

The handle has two unusual features. It permits stowing of the drawhook to protect it from damage when in the open position and also permits the use of two hands or a bar to pull open if icing or other conditions impede normal operation.

Camloc Fastener Corp., 22 Spring Valley Road, Paramus, N.J.

Use postpaid card. Circle No. 27

NUT-WASHER COMBINATION HAS HIGH SPRING TENSION

A nut and helical spring washer are permanently held together but free to rotate when pressure is applied. The Fastite nut is designed to give a wide reactive range and high spring tension. This reduces the failure of bolted assemblies due to bolt stretch, thread creep and linear dimensional changes caused by rapid thermal expansion or contraction.

Reliance Division, Eaton Mfg. Co., Massillon, Ohio.

Use postpaid card. Circle No. 28

SELF-FLUXING BRAZING ALLOY MELTS AT 1300°F

A copper phosphorus alloy that does not require flux on copper to copper joints starts to melt at 1300°F and has a wide brazing range.

This general purpose alloy finds use on copper, brass, bronze and other alloys. It is a ductile rod with high corrosion resistance. Phos Sil O conforms to AWS specification BCuP-2 and Federal specification QB-00655A. Its tensile strength is 90,000 psi.

American Brazing Alloys Corp., P.O. Box 11, Pelham, N.Y.

Use postpaid card. Circle No. 29

COLOR COAT FASTENERS TO MATCH PANELS

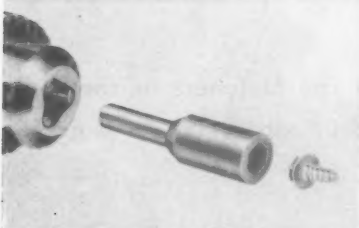
Heads of Tuff-Tite screws, bolts or curtain wall studs can be color coated before shipment to match any sheet or panel. The modified-acrylic coating resists abrasion and weathering when applied to 305 stainless steel fasteners.

The undercut fastener heads, in combination with the entrapping action of the assembled conical neoprene washer, improve the appearance for siding and curtain walls. Color matching by spectrophotometrics eliminates human judgment in selecting colors.

Engineered Fasteners Div., Townsend Co., Box 71-Z, Ellwood City, Pa.

Use postpaid card. Circle No. 30

SHEET METAL SCREW DRILLS OWN HOLE



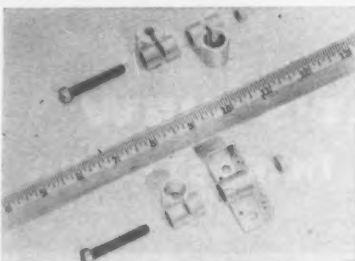
A screw will penetrate and engage securely in sheet metal without the necessity of a pre-drilled or punched hole, when driven by a standard 1/4" electric drill equipped with a magnetic hex socket.

The fasteners, which can also be manually driven, are made in sizes No. 6 diameter by 3/8" through No. 10 x 3/4". Samples.

Duro-Dyne Corp., Route 110, Farmingdale, L.I., New York.

Use postpaid card. Circle No. 31

ROD, TUBE AND PIPE ASSEMBLY SYSTEM



Speed and ease of assembly, strength and adjustability are advantages claimed for Rotocon assemblers, a new type of assembly system for tubes, rods, and pipes.

Die-cast zinc alloy units grip all-around the tubes or piping instead of gripping only at the tip of a fastening screw as with conventional fasteners. Tight all-around grip does not burr, score or distort.

Toothed faces of paired fittings form rigid joints at any 10° increment, not merely at right angles. Since the fastening nut rests in the unit, tightening the screw sets the all-around grip at the same time that it locks the joint at the angle chosen. The resultant joint is neat with no protrusions. The screw and nut are concealed in the fitting recesses.

Rotocon Division Unistrut Products Co., 933 W. Washington Blvd., Chicago 7, Illinois.

Use postpaid card. Circle No. 32

SUB-MINIATURE INSTRUMENT RIVETS ARE GOLD PLATED



Miniature rivets for instrumentation combine advantages of both solid and tubular rivets in a concentrically deep drilled shank. The solid upper portion of the body contributes rigidity and avoids buckling and bending in the upsetting or clinching operation. The drilled section controls material flow. The non-magnetic fasteners are 24 carat gold plated to avoid spatter when soldered or chipping when set. They come in sizes from 1/32" to 1/8".

Circon Component Corp., Goleta, California.

Use postpaid card. Circle No. 33

GRC die cast WING & THUMB SCREWS

4 types to meet ALL needs

GRC offers you quality, quantity and economy PLUS your choice of two basic styles—one-piece zinc alloy die cast fasteners or assembled zinc alloy blanks with screw material of other metals. Wing Screws have generous washer-type shoulders, patented recessed finger-grip wings. Thumb Screws have exclusive wide heads for firm, comfortable grip; plain or shoulder type.

Clean accurate threads. Bright, rustproof, non-corrosive finish. Wide range of styles, threads and lengths.



Write NOW for prices and GRC's new catalog of Die Cast and Molded Industrial Fasteners

World's Foremost Producer of Small Die Castings

GRIES

GRIES REPRODUCER CORP.
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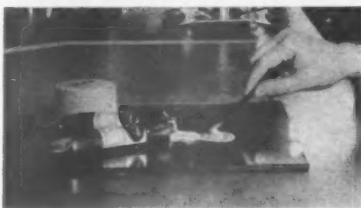
Reprints are available of the following articles published in "Assembly & Fastener Engineering":

- "Torque Considerations in Design"—January, 1960
- "Which Thread—Coarse or Fine?"—February, 1960
- "The Strength of Screw Threads"—June, 1960

If you need a copy or two for your reference files, just drop us a note on your company letterhead.

Reader Service Department
ASSEMBLY & FASTENER ENGINEERING
Wheaton, Illinois

NEW MIXING SYSTEM FOR TWO-COMPONENT ADHESIVE



A two-component adhesive has a mixing system to speed bonding of metals, thermosetting plastics, rubber, glass or wood.

Equal lengths of a blue-colored paste and yellow-tinted hardener are squeezed from a tube and mixed to a uniform light green shade before use.

Stabond EP-110 will cure at room temperature or can be oven heated for rapid setting. It is available in two-oz. tubes and up.

American Latex Products Corp., 3341 W. El Segundo Blvd., Hawthorne, Calif.

Use postpaid card. Circle No. 34

CAPTIVE SCREW ASSEMBLY FOR PANEL FASTENING



A captive panel screw assembly is available for panel thickness of 1/16", 1/8", and 3/16".

The new panel screw, No. 1805, is corrosion-resisting steel, class 303 (class 303SC) per QQ-S-763b with a No. 10-32 NF-2 thread. Head of screw is polished and slotted with a medium straight knurl side and passivate finish. Captive panel screw bushing is brass per QQ-B-626a, Comp. 22 1/2 hard, finished with light polish and .0005" nickel plate.

Cambridge Thermionic Corp., 445 Concord Ave., Cambridge 38, Mass.

Use postpaid card. Circle No. 35

NEW HEAD & THREAD HIGH STRENGTH BOLT DESIGN

Savings up to 40% in bearing-type connections over present high strength bolts are made possible by a new head and thread design.

Advantages of the new design include: Larger bearing area under the head will permit the use of only one washer per bolt. It can be used under either bolt head or nut, whichever is rotated in tightening.

Shorter thread length will prevent the shear plane of the connection to pass through the threaded portion of the bolt. Increasing the shear area of the bolt increases the allowable working shear stresses so that one-third fewer bolts are needed in bearing-type con-

Now! Special, Timesaving *Snap-on* Tool Kit for Electronic Assembly and Maintenance



5049-ET-B ELECTRONIC ASSEMBLY TOOL SET

49 tools including 1/4-in. sq. drive ratchet, extensions, Flexextension, universal joint and 2 plastic-handle drivers; 15 sockets, 1/8" to 1/2"; 4 open-end wrenches, 3/8" to 3/4"; 4 Boxsocket® wrenches, 3/8" to 1 1/2"; 10 screwdrivers, Phillips and standard bits; screw starter; 6 pliers and cutters; soldering iron.

This new SNAP-ON kit of specially selected tools is made up to reduce costly labor time on electronic assembly and maintenance work.

Tiny wrenches slip between closely fitted assemblies on nut-turning jobs. Smooth, well-shaped handles aid efficiency of both men and women assemblers.

Thin blade tips on screwdrivers, with tips the same width as shank diameter, follow screws below surfaces, can reach in among intricate assemblies.

Pliers include needle nose, duck bill and diagonal cutter with plastic-covered handles — also midjet tapered nose cutter, midjet gripping pliers and special needle nose gripper-cutter. Both diagonal cutters have plastic jaw inserts which hold wire cutoffs.

Eighteen-watt, pencil-type soldering iron maintains constant 850° F. tip temperature for work on printed circuits or tiny assemblies. Entire set fits neatly in strong metal box for convenient carrying or storage.

These tools are top quality throughout — cost less because they outlast cheaper tools over and over. Use of fine steels permits light weight, slim, yet strong, tools that fit properly.

Put new speed on your assembly line with this SNAP-ON electronic tool set or one especially selected for your specific jobs. Write us or call your nearest SNAP-ON branch.

FOR ALL INDUSTRY
SNAP-ON TOOLS
8033-G 28th AVENUE • KENOSHA, WISCONSIN
Use postpaid card. Circle No. 250

nections which form the majority of structural joints.

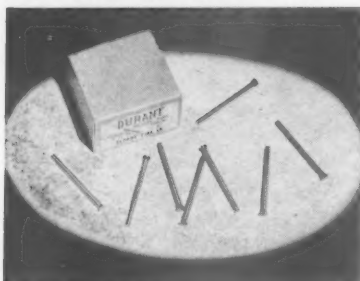
The large head bolt has the same across-flats dimensions as the presently used heavy nut, eliminating the requirement for the two different wrench openings presently needed.

Tightening is possible from either nut or from bolt head, an advantage in tight spots where clearance is a problem. The hardened washer is used under the rotated member.

Russell, Burdall & Ward Bolt & Nut Co., Port Chester, N.Y.

Use postpaid card. Circle No. 36

NEW SIZES IN TOOL STEEL HEADED PINS



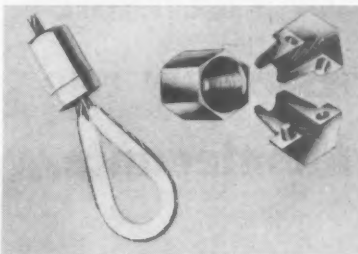
Previously unobtainable sizes in headed pins have recently been introduced. The new sizes include pins up to 1/4" in diameter in 2, 4, and 6" lengths. All-tool steel Rockwell C 58/60 honed finish with heads left soft, these headed

pins have no pickup and are guaranteed uniform. These sizes are in addition to 111 stock sizes.

Durant Tool Company, 12 Thurbers Ave., Providence 5, R.I.

Use postpaid card. Circle No. 37

LINE CLAMPS FOR RIGHT HAND LAY STEEL WIRE ROPE



Safe-Line Clamps are designed for use on 6 x 19 and 7 x 19 right hand lay steel wire rope.

When the nut is tightened, holding contact is complete. The reusable clamp's elastic gripping action adjusts to rope "creeping" or changes in stress.

The clamp's design permits rapid assembly by vise or wrench on the job, or assembly fixture for quantity production. Sharp wire ends are enclosed and projections are eliminated for safe assembly and disassembly, neat appearance.

The Lamson & Sessions Co., 5000 Tiedeman Rd., Cleveland 9, Ohio.

Use postpaid card. Circle No. 38

DOUBLE FACED SELF-ADHESIVE MOUNTING STOCK



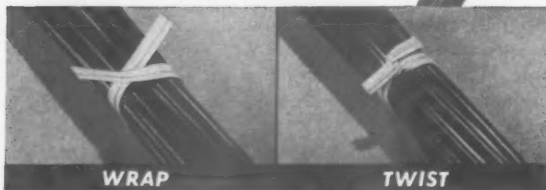
A double faced self-adhesive mounting stock which will not creep and adheres to both horizontal and vertical, smooth or porous surfaces will permanently hold lightweight metal, all vinyls and plastic tiles to walls, ceilings or floors. Mactac mounting can be used with rubber or other synthetic materials.

The self-adhesive mounting stock is easy to use. The actual double faced self-adhesive comes sandwiched between two backing papers which are specially designed to protect the self-adhesive from aging and to give quick release. When applied, the stock is cut to fit the area where it is to be used. Then, one side of the protective covering is removed, exposing the MACTAC self-adhesive mounting stock. This exposed side is pressed onto the item to be fitted in place. Then, the other covering paper is removed and the item fixed to its desired area. Samples,

Morgan Adhesives Co., 4560 Darrow Rd., Stow, Ohio.

Use postpaid card. Circle No. 39

Speed Tying Operations!



- ★ Cheaper than String
- ★ Faster than Tying
- ★ Sure Grip
- ★ Colorful

H.F. Hanscom & Co., Inc.
5 Virginia Avenue
Providence 5, R. I., U.S.A.

Top view of Hanscom-Tie as shown. Bottom is flat

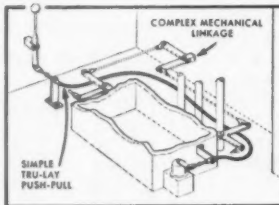
NO KNOTS TO TIE!

Cut your tying time in half! Hanscom-Ties are the fast, sure way to bundle wires, cords, coils, etc. Nothing to tie. Just wrap 'em around and twist. For temporary or semi-permanent holding. Available in cut lengths 1" to 24" and on spools - bright colors or printed. Prices from 26c per thousand. WRITE FOR SAMPLES and TRY 'EM YOURSELF.

Hanscom-Ties

Use postpaid card. Circle No. 251

TRU-LAY PUSH-PULL DATA FILE SHOWS HOW TO SIMPLIFY AND IMPROVE DESIGN



Push-Pull remote controls, shown here, are flexible, have but one moving part, and give a lifetime of accuracy. Mechanical linkages are complex, are made of many parts, wear at many points, and produce increased backlash, lost accuracy, and vibration rattles.

This Push-Pull Data File—containing 7 engineering bulletins—will show you how these flexible controls have eliminated mechanical linkages on hundreds of products. You can make your products more useful, easier to sell, with Push-Pull controls. Write for your Data File today.



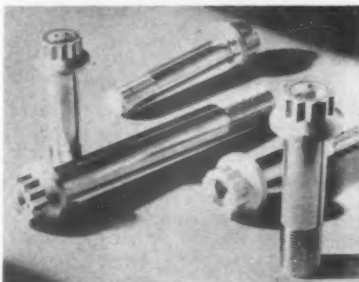
Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

601 D. Stephenson Bldg., Detroit 2
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929-D Connecticut Ave., Bridgeport 2, Conn.

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Assembly and Fastener Engineering

INCREASE BOLT-NUT UNIT STRENGTH 15-25 PERCENT



A bolt and mating locknut are rated at 200,000 psi tensile strength at 900°F. The joint is capable of 260,000 psi tensile at room temperature.

The 926 series runs 15 to 25% stronger in tensile, shear, fatigue mechanical properties over the line's strongest previous 900°F bolt-nut joints, the TM 9 and LWB 922 series.

The bolt is a 12-point external wrenching type made of 5% chrome high-strength steel alloy. Threads are the Hi R form with large radiused root.

The series is produced in diameter sizes No. 10 through 7/8", fine thread series. They are 100% magnetic particle inspected.

Standard Pressed Steel Co., Jenkintown, Pennsylvania.

Use postpaid card. Circle No. 40

NYLON PARTS FROM STOCK MOLDS



Nylon parts are now available from stock molds. Among the assortment are washers, bushings, rollers, gears, bearings, glides and parts designed for specific applications. Parts fabricated of Delrin are also available.

Nylomatic Corp., 112 W. Trenton Ave., Morrisville, Pa.

Use postpaid card. Circle No. 41

FINGER-PRESSURE ADHESIVE FOR FOAMED PLASTICS

When foamed polystyrene and polyethylene is coated with Poly-Stix adhesive and allowed to dry, the coated foam becomes pressure-sensitive and will adhere to almost any surface in a manner similar to pressure-sensitive tape. This makes it possible to stick foamed plastic to almost any surface,



Airflex®
PRECISION RIVETERS

**TAKE THE
TOUGH
JOBS**



**High Frequency
IMPACT
with Spinning**

Airflex® Riveters bring an entirely new technique to the field of fastening. Riveting now becomes feasible under conditions that previously made it impractical.

Wherever tolerances or riveting pressures are critical, or assemblies and materials are apt to distort or fracture, the Airflex® cold-flow principle has provided the solution. Selective tolerances as close as .002" between peened end of the rivet and the material are being maintained even on volume production. Materials impose no limitations—glass, ceramics and plastics can also be riveted economically. Capacity for steel rivets range from 3/32" to 1". Silver, aluminum, brass, copper, titanium rivets also—hollow or solid—from 1/16".

Airflex® Riveters can give you faster, better riveting on routine jobs—and the economy of riveting on the "impossible" jobs. Write now for complete information.

AIRFLEX® PRINCIPLE combines high frequency blows with a spinning action to cold-flow the rivet. Force and rate of impacts, duration of impacts and spinning speed are independently controlled. Operator training is cut to a minimum.

LEMERT ENGINEERING CO., INC.
191 E. JEFFERSON ST., PLYMOUTH, IND.



Airflex®
RIVETERS DIMPLERS



Use postpaid card. Circle No. 253

including wood, metal, glass and plastic without the need of applying adhesive at the time of use.

The adhesive is easily applied by brush, spray or roller coater. It is available in 55-gal. drums and in one- and five-gallon cans.

Adhesive Products Corp., 1660 Boone Ave., New York 60, N.Y.

Use postpaid card. Circle No. 42

THREADED INSERT TAPS OWN HOLE



A threaded insert taps its own hole with recessed grooves and knurling. Torq-Loc is installed by standard presses and can be used in any material that cold flows.

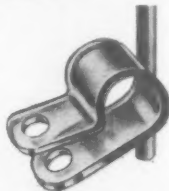
The holding feature is independent of the screw which is driven or removed in conventional manner. Suitable for hopper feeding and automatic installation, the fastener is available in thread sizes from 4-40 through 1/4-20 in 3/8" length.

Torq-Loc Div., Bergen Laboratories, Inc., 60 Spruce St., Paterson, N.J.

Use postpaid card. Circle No. 43

MOULDED CONTOUR BETTERS PLASTIC CABLE CLAMP

A one-nail-or-screw plastic loop type cable clamp has been improved by a molded, rather than heat-formed, contour. Greater strength at critical angle and a plastic "memory" in the shape-of-use position is reported. It is deformed only to insert the cable, harnesses, tubing etc.



Commercial Plastics Co., 941 George St., Chicago 14, Ill.

Use postpaid card. Circle No. 44

HIGH STRENGTH BOLTS WITH GREATER BEARING AREA

High-strength bolts, with increased across-flats dimensions resulting in greater bearing area, range in diameter from 1/2" to 1 1/2". The fasteners conform to the latest A-325 specification of the American Society of Testing Materials.

By increasing the width of the hex head to the same dimensions as the nut, it is possible to torque the bolts and nuts with the same wrench or socket. In many cases the use of one washer will be eliminated.

Tension can be raised from 90 to 100% of minimum proof load. Mini-

mum bolt tension ranges from 12,000 psi in 1/2" sizes to 103,950 psi in 1 1/2" sizes.

Screw and Bolt Corp. of America, Box 1728, Pittsburgh 12, Pa.

Use postpaid card. Circle No. 45

QUICK-DISCONNECT TERMINAL FOR BRUSHES



A quick-disconnect terminal assembly for brushes is designed to facilitate brush replacement on electric utility equipment, and on any motor or generator in which the brushes are difficult to reach.

The assembly consists of a stationary clip bolted to the machine, into which either one or two terminals can easily be snapped. All parts are silver-plated beryllium copper for minimum resistance.

National Carbon Co., 30 E. 42nd St., New York 17, N.Y.

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ELECTRIC FEED SPEEDS EYELETTING

EXCLUSIVE SIMPLIFIED EYELET-RELEASE



Get the facts!

on the New Low Cost ETCO AE-100

This new foot-operated (or fully automatic air-operated) machine has a jam-proof, electrically driven feed. The belt driven agitator, built into the hopper, automatically feeds the eyelets to the track and down to the work position, enabling the operator to work at his fastest speed. Exclusive, simplified, foolproof, eyelet-release prevents waste of eyelets.

The generous 11" throat depth and high overhanging arm provide excellent visibility and permit easy handling of large pieces. Interchangeable tracks accept all standard make eyelets and sizes. Send for complete information.

for

Printed Circuits
Component Assemblies
Cloth & Leather
Assemblies



EYELET TOOL

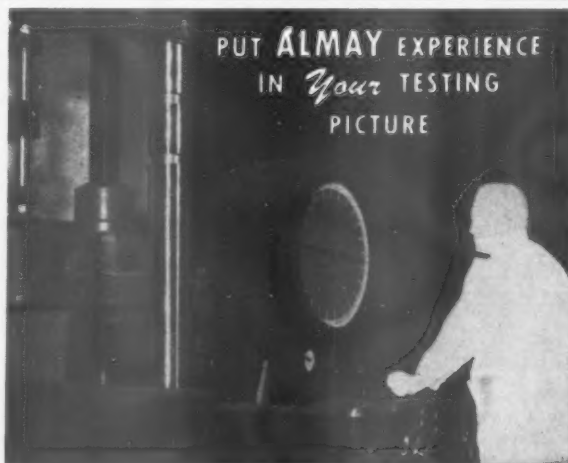
COMPANY, INC.

236A BROADWAY

CAMBRIDGE, MASSACHUSETTS

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PUT ALMAY EXPERIENCE IN Your TESTING PICTURE



ALMAY—a complete independent testing laboratory to support your routine or research requirements. As specialists in the field of fasteners, direct assistance can be extended by our engineering staff in:

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- Investigation & Research Projects, including Cryogenic (—300°F) & elevated temperature (2000°F) static—fatigue—creep & stress rupture testing, etc.
- Military & Commercial specification Qualification Testing
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The ALMAY test report—your assurance of a job "Well Done.!!"



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"first in fastener research"

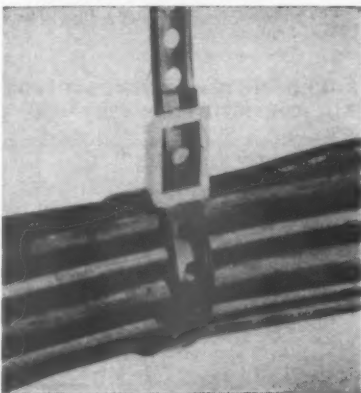
3510 E. 14th Street

Los Angeles 23, Calif.

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Assembly and Fastener Engineering

RATCHET BUCKLE BROADENS USES OF NYLON STRAPPING



A nylon ratchet buckle has made perforated nylon strapping adaptable for many new applications. The buckle holds one end of the strapping fast on its ratchet button. The other end adjusts to desired tightness.

Special clamps or hangers can be made to any size for securing larger bundles of wires, cables, rods, tubing and pipe. The one-piece molded nylon device is made in sizes for use with $\frac{3}{8}$ ", $\frac{1}{2}$ " or $\frac{5}{8}$ " wide strapping.

A special plier-type tightening tool is available for making very tight bundles.

Weckesser Co., Dept. AE-3, 5701 Northwest Hwy., Chicago 46, Ill.

Use postpaid card. Circle No. 47

SELF-ADHESIVE MYLAR VINYL LAMINATING TRIM



A range of self-adhesive metalized Mylar vinyl laminate materials will replace metal trim for many applications. The material consists of a layer of metalized Mylar film laminated to vinyl. The surface film being Mylar is extremely tough, has high tensile strength and is abrasion resistant. It resists acids, alkalies, grease and many common solvents. Underlying metalized surface is completely protected by the Mylar film. The subsurface vinyl film thickness (ranging from 4 mil to 12 mil) adds materially to the over-all body of the material and permits deep embossing.

Available in rolls, strips and sheets, this material is adaptable for many types of decorative panels and trim. Further processing by die-cutting, silk screening and hot stamping makes pos-

Are you designing to series 60 standards? If so, specify Bristol.



This DOUBLE-DIAMOND knurl
marks the BRISTOL "Series '60"

... the cap screw that holds more ... indents less ... wrenches tighter than ever before ... meets or exceeds all new "Series 1960" standards of Socket Screw Manufacturers' Committee. Of course, regular Bristol "Series 1936" standard screws are still available in hex or Bristol Multiple Spline.

Precision socket screw manufacturers since 1913



*Made in sizes as small as No. 0 in Alloy Steel and Stainless Steel. Cap screws up to 1 1/2" diameter.

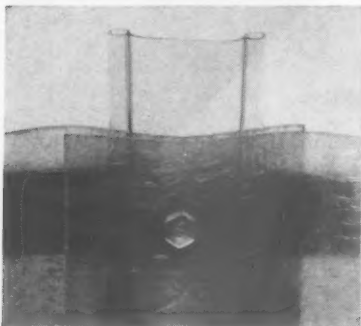
THE BRISTOL COMPANY Socket Screw Division
Waterbury 20, Conn.

Use postpaid card. Circle No. 256

sible finished parts, nameplates and labels in a wide variety of designs. Fasson Products, 250 Chester St., Painesville, Ohio.

Use postpaid card. Circle No. 48

SIDE LAP SEALING STRIP FOR CORRUGATED PANELS



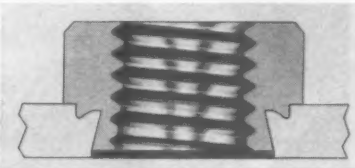
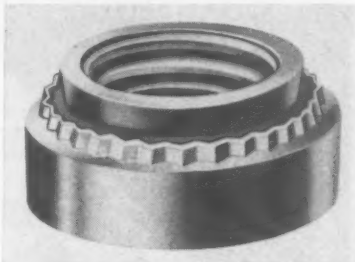
Vinyl Lapseal is a clear sealing strip for side laps on corrugated plastic panels, metal, and corrugated glass roofing and siding sheets, skylights. Two beaded edges furnish a compressive weather-tight seal without the use of caulking. Material will not harden or crack in extreme temperature changes, light transmission is not impaired.

Installed in a few seconds, Dual Seal Vinyl Lapseal is available in 50' rolls for easy handling in 1", 2" and 3" widths.

Fabricated Products, West Newton, Pa.

Use postpaid card. Circle No. 49

SELF-CLINCHING FASTENER FOR SHEET DOWN TO .032"



Self-clinching fasteners are designed for providing load bearing threads in sheet metal of thicknesses down to .032" and of Rockwell hardnesses of B-70 or less.

Installed by any standard pneumatic or oil-hydraulic squeezer, into previously punched or drilled holes, parts are positively locked into the sheet metal with high push-out and torque resistance. They do not project on reverse side of sheet.

The parts are made in carbon steel with various rust resistant finishes and

in Type 303 stainless steel with thread sizes from 0 to 3.

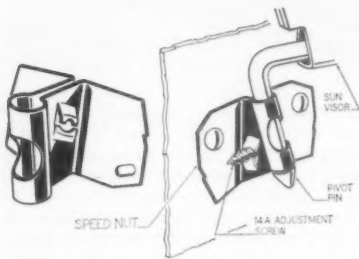
Penn Engineering & Manufacturing Corp., Doylestown, Pa.

Use postpaid card. Circle No. 50

SPEED NUT COMBINES PIVOT ACTION, FRICTION FIT

A new Speed Nut is designed to fasten sun visors to truck cabs.

The new spring steel fastener, which provides adjustable compression on the visor's pivot pin, is attached to the cab panel through two elongated mounting holes which permit a sliding lateral movement of the mounting feet during



adjustment. A 5/16" diameter pivot rod is then inserted into the barrel of the fastener and the adjustment screw is tightened to the desired degree. A decorative cap covers the assembly.

Spring tension fastening can be employed on adjustable louver assemblies, damper assemblies, folding tables or

For Stud Setting and Pulling and TORQUE CONTROL TOOLS

"Titantorker" Controlled Torque Driver



For variety of torque uses. Audible signal when desired torque is reached. Easy adjustment. Four sizes: maximum torques from 75" lb. to 225" lb. Female adapters in driving head; male adapters on torque base.

Controlled (Torque) Drive Stud Driver



Predetermined amount of torque can be applied to stud during driving. Simply adjusted by two Allen screws in spring adjusting nut—downward, increased torque; upward, decreased torque. For use with any air or electric drill or drill press. Sizes #101—#102—#103.

"Bull Dog" Stud Driver Designed for Use With Impact Wrenches



Built for rugged use on heavy engines. Equipped with Titan Design, Loose Pressure Plunger. Definitely stands up under vibration encountered when using an impact wrench for motive power.

Titan "Roll Grip" Combination Stud Driver and Puller



Incorporates roll action to grip as little as 1/4 in. of unthreaded body of stud. Made in standard sizes from 3/16 to 3 in. inclusive.



World's Largest Producers Of
Stud Drivers And Pullers

TITAN TOOL CO.

47 MAIN ST., FAIRVIEW (ERIE COUNTY), PA.

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Plasti-Plugs

45 STANDARD SIZES

FASTEX® Plast-i-Plugs® snap-in type plastic plugs—
are available for a wide range of applications, including:

- Ventilation Holes
- Indicator Buttons
- Access Holes
- Appliance Feet
- Sealing Plugs
- Spacer Buttons
- Frictionless Glides
- Conduit Holes

Available in several plastic materials, Plast-i-Plugs can be color-matched to your product saving expensive rack painting, and they just snap in.

Write for FREE Plast-i-Plug Folder.

FASTEX

195 Algonquin Road, Des Plaines, Illinois
In Canada: SHAKEPROOF-FASTEX,
Division of Canada Illinois Tools Ltd., Toronto, Ont.
A DIVISION OF ILLINOIS TOOL WORKS

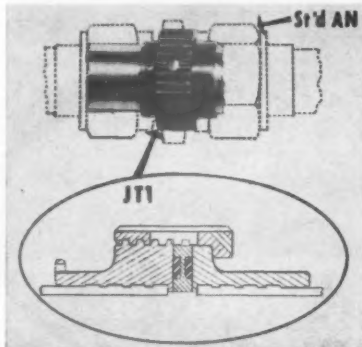
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Assembly and Fastener Engineering

wherever pivoting action is required and a friction fit desirable.

Tinnerman Products, Inc., Box 6688, Cleveland 1, Ohio.

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EASILY INSTALLED TUBE CONNECTOR CUTS WEIGHT



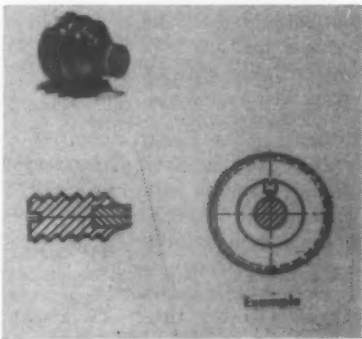
A tube connector (pictured with equivalent standard connector) has a sealing method assuring no-leakage under extremes of temperatures, pressure and vibration. The mechanical attachment to the tubing eliminates beading, flaring or welding.

Weighing about 20% of an AN connector, the new connector can be coupled and uncoupled by hand. It is available in sizes from 1/4" through 2" for temperature range of -70°F to 450°F. Specials are also available.

Gamah Corp., 1654 Lincoln Blvd., Santa Monica, Calif.

Use postpaid card. Circle No. 52

NYLON-TIP SET SCREW HAS FULL FACE CONTACT



More varieties of a nylon-tipped set screw are now available from stock. When the set screw is applied in a gear or hub and tightened to a basic shaft, the tip protects the shaft from marks and has full face contact.

When locked in place, No-Mar's nylon tip takes the shape of the curved shaft. By imbedding itself in the thread hole, it offers a self-locked washer effect.

The screws are available with slotted or socket head in sizes from No. 2-56 to 1/4"-20 in stock lengths.

PIC Design Corp., 477 Atlantic Ave., E. Rockaway, New York.

Use postpaid card. Circle No. 53



COST-CUTTING PRODUCTION TEAM!

... the two-way answer to assembly problems



Here's a combination that cuts production costs and gets rid of assembly problems in a hurry—Milford Tubular Rivets made to high quality standards to assure a better finished product for you... Milford automatic rivet-setting machines that can be quickly adapted to your particular fastening needs.

Milford's MANUAL OF MODERN RIVETING PRACTICE may have the answers to your riveting problems. Ask a Milford Representative to show you how to use this manual to cut production costs.

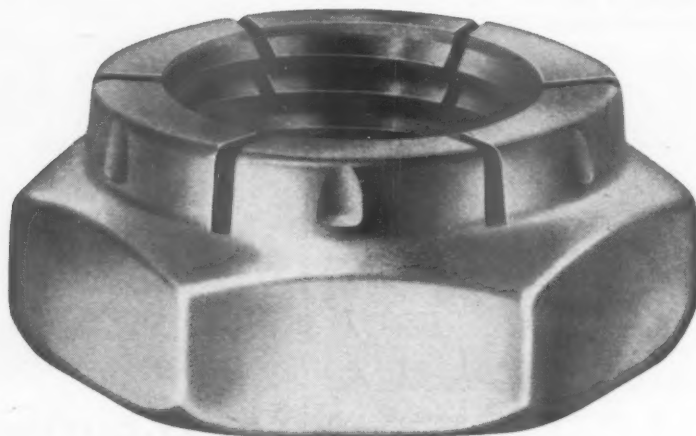


MILFORD RIVET & MACHINE CO.

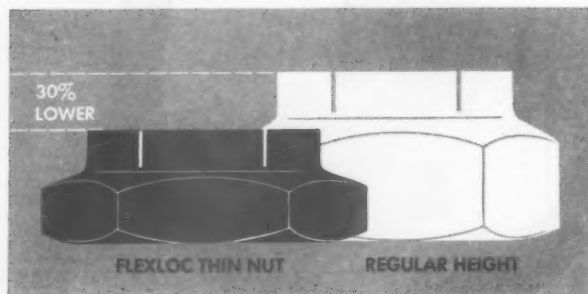
MILFORD, CONNECTICUT • NORWALK, CALIFORNIA
ELYRIA, OHIO • AURORA, ILLINOIS • HATBORO, PA

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FLEXLOC thin nut...



**30% LOWER,
VIBRATION-PROOF,
CUTS ASSEMBLY TIME TWO WAYS**



Fits where other nuts won't . . . holds tight for keeps . . . goes on faster. That's the self-locking FLEXLOC thin nut.

30% lighter and lower, FLEXLOC thin nuts save weight and space, frequently fitting where clearance is insufficient for standard height nuts. And make no mistake about it—FLEXLOC thin nuts won't budge, even in the face of impact or vibration, because every thread, including those in the locking section, carries its full share of the tensile load. What's more, FLEXLOC locks without seating, and is thus stopnut as well as locknut.

When it comes to beating the clock, FLEXLOC thin nuts are doubly valuable. First, since you use shorter bolts with them, a shorter distance—and less time—is required to run the nuts home. And second, since they are 1-piece fasteners—no lock-washers, jam nuts or cotter pins to put together—assembly time and costs are even further reduced.

FLEXLOC thin nuts, which can be readily removed and repeatedly reused, come in sizes from #6 to 1½ in. For complete information, see your authorized industrial distributor or write STANDARD PRESSED STEEL CO.—manufacturer of precision threaded fasteners and allied products in many metals. INDUSTRIAL FASTENER Division, SPS, JENKINTOWN 78, PENNSYLVANIA.

SPS

where reliability replaces probability

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Assembly and Fastener Engineering

USEFUL LITERATURE

To receive your copy of any literature reviewed here, use the postpaid card opposite page 66.

DESIGNING FOR BRAZING

"Designing for Preforms" details the design considerations and pictures of metal joints which lend themselves to use of brazing alloys in preformed shapes. The attractive 20-page reference manual has sections on material selection, fluxes, application of various ring types, use in electronics. Lucas-Milhaupt Engineering Co., 5051 S. Lake Dr., Cudahy, Wis.

Use postpaid card. Circle No. 92

COLOR MATCHED FASTENERS

Construction Tuff Tite fasteners with heads and integral washers colored to match the siding and pictured in a multi-colored flyer. How exact shades can be spectrophotometrically matched is explained. Townsend Co., Ellwood City, Pennsylvania.

Use postpaid card. Circle No. 93

TERMINALS

Terminals in continuous strip form and an automatic crimping machine are specified and dimensionally drawn in a loose-leaf catalog. Twenty-nine types are available in a wide range of stock sizes and materials. Electrix Corp., Ashton, R.I.

Use postpaid card. Circle No. 94

QUICK-OPENING FASTENER

Cam-Bolt is used where the strength of a bolt is required but where fast opening is desirable. A data sheet introduces the special fastener now being used on missile and engine containers. Features and installation procedures are given. Simmons Fastener Corp., North Broadway, Albany 1, N.Y.

Use postpaid card. Circle No. 95

SECONDARY OPERATIONS

Automatic drilling, tapping and threading machines and systems are described in a 12-page catalog. Production techniques possible and the wide

range of basic drilling operations are illustrated. Universal-Automatic Corp., 9545 Ainslie St., Schiller Park, Ill.

Use postpaid card. Circle No. 96

STANDARD SCREWS

Standard hex & hex screws, lag screws and carriage bolts are specified, dimensionally drawn and pictured in a six-page brochure. More than 500 sizes are available. Also briefed is the company's entire line of socket screw products and other standard nuts, studs, pins and screws. Standard Screw Co., 2701 Washington Blvd., Bellwood, Ill.

Use postpaid card. Circle No. 97

AUTOMATIC ASSEMBLY

How specific application tooling can be added onto basic 6" linear assembly machines to cut costs is told in a six-page brochure. Dimensional drawings of the Transferline unit, feed mechanism, photos and descriptive data are given. Gilman Engineering and Mfg. Co., Janesville, Wis.

Use postpaid card. Circle No. 98

IMPACT WRENCH

A $\frac{5}{8}$ " impact wrench has been designed with 20% more power and 200% faster rundown than its predecessor. Six-page Form 5279 lists features and specifications with accompanying application photos. Ingersoll-Rand Co., 11 Broadway, New York 4, N.Y.

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ALLOY SELECTION CHART

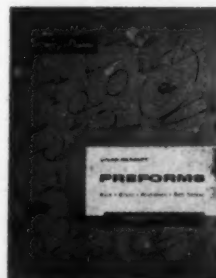
A welding aid specifies correct filler alloys for all recommended wrought alloy parent metal combinations. Acceptable alloys are given an A, B, C or D rating for the service requirements of ease of welding, strength of joint, corrosion resistance, service suitability at temperatures over 150°F, color match after anodizing and ductility. Alumi-



(See 97)



(See 94)



(See 92)

num Company of America, 1501 Alcoa Bldg., Pittsburgh 19, Pa.

Use postpaid card. Circle No. 58

LOCKING SCREWS

Manufacturing standards of the Nylock-insert screw are charted in an eight-page brochure. The chart also includes torque recommendations, plug protrusion, and dimensional data for both blunt and chamfered ends. Features of the self-locking screw are illustrated. Continental Screw Co., New Bedford, Mass.

Use postpaid card. Circle No. 59

VERIFYING TOOL OUTPUT

A program to check power or torque output of power tools is recommended in a four-page data sheet. Using a tension tester as a gage, test bolts are driven to establish norms. Instructions and check lists are provided. The Skidmore-Wilhelm Mfg. Co., 442 S. Green Rd., Cleveland 21, Ohio.

Use postpaid card. Circle No. 60

BLEMISH-FREE WELDING

Principles of spike welding and available equipment are presented in four-page Bulletin 601. Samples of typical vinyl-coated steel, aluminum and electronic parts welded without discoloration are pictured. Welder specifications and dimensions are given. Weldex Division, The Metal Craft Co., 3300 Doris St., Detroit 38, Mich.

Use postpaid card. Circle No. 61

SELF-LOCKING NUTS

For use wherever shock or vibration is a factor, Anco nuts are locked by an integral steel pin which acts as a ratchet when the nut is tightened. Sizes in coarse and fine threads listed. Samples. The Automatic Nut Co., Inc., Lebanon, Pennsylvania.

Use postpaid card. Circle No. 62



CHAIN FASTENERS

How beaded chain can be used for fastening is illustrated in a 12-page catalog. Standard, special chains with various types of couplings, splicing links, end rings are specified. Also introduced is a process for swaging pins. The Bead Chain Mfg. Co., 110 Mountain Grove St., Bridgeport 5, Conn.

Use postpaid card. Circle No. 63

STANDARD PARTS

Catalog 90 pictures over 1000 parts—eyelets, snap fasteners, clamps, tips, ferrules, rivets, stampings, hangers, electrical parts—available from stock

in many materials. Eyelet and riveting machines are also pictured and specified. Edwin B. Stimpson Co., Inc., 70 Franklin Ave., Brooklyn 5, N.Y.

Use postpaid card. Circle No. 64

SCREW DEVELOPMENTS

New product developments in a line of standard screws are highlighted in four-page Form 200B. The W-point socket set screw and 1960 series cap screw are introduced in addition to thread-cutting, self-tapping, weld screws, Sems, construction screws, Parker-Kalon Div., Clifton, N.J.

Use postpaid card. Circle No. 65

TUBE COUPLINGS

Flexible couplings, tube connectors and hose couplings utilize special fitting-to-tube fastening methods for extra strength. Details on the light-weight couplings and sealing action are illustrated and described in a four-page folder. Gamah Corp., 1654 Lincoln Blvd., Santa Monica, Calif.

Use postpaid card. Circle No. 66

EYELET ASSEMBLY

Features of six different foot-operated or fully automatic air or electric eyeletting machines are diagrammatically pointed out in a four-page bulletin. Photos and specifications. Eyelet Tool Co., Inc., 31 Carleton St., Cambridge 12, Massachusetts.

Use postpaid card. Circle No. 67

Job-Designed Nails for Every Industry

Here is a fast, dependable, low cost, quality minded source of supply for JOB-DESIGNED nails of all types, in any metal, to fit your own assembly problem. Assembly costs are a very major part of manufacturing expense. Most of this is labor. The fastening medium itself is usually a minimum item. If a Job-Designed fastener makes assembly simpler and faster, permits the use of fewer fasteners, allows the designer functional freedom and improves product efficiency, yours is a specifying job well done. All these

possibilities are available when you come to Hassall for design assistance and quotation on challenging, difficult or unusual nails, rivets, threaded parts, drive screws and other cold headed parts. Short or long runs, pilot quantities, engineering counsel, over 100 years of intimate association with cold heading—and a deep appreciation for the concept of value analysis—all are part of the Hassall service to you.

Send for a copy of our latest catalog.

MANUFACTURERS SINCE 1850

JOHN HASSALL, INC.
P. O. Box 2217 • Westbury, Long Island, N.Y.

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BEHR SINGLE and DOUBLE STROKE COLD HEADERS

FOR UPSETTING AND FORGING BOLTS, SCREWS, RIVET HEADS AND OTHER SIMILAR SHAPES!

**175
PIECES
PER
MINUTE
DSSD**

Capacity of wire, 1/4"; Stroke, 3"; Maximum length of cut-off, 2-7/8"; Maximum length of blank under head, 2"; Diameter and length of heading die, 1-3/4" x 2-1/2"; Diameter of finished punch, 1-1/4" x 2-1/4" long; Speed—Number of pieces per minute, 175; Number of strokes per minute, 350; Lubrication, Force Feed; Weight, 6000 lbs.; Overall dimensions, 81" x 46" x 51"; Motor, 7-1/2 HP, 3 phase, 60 cycle, 220/440 volts. Each header complete with motor, push button station, and foot brake.

MANVILLE 250C HEADER PARTS AVAILABLE FROM STOCK

CALL ROCKFORD Woodland 2-7721 or WRITE for LITERATURE and PRICES

MACHINERY & EQUIPMENT CORP.
1210 SEMINARY ST.
ROCKFORD, ILLINOIS

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Assembly and Fastener Engineering

ASSEMBLY ROBOT

Design and operation, as well as the programming and set-up, of an automatic parts assembler is told in a six-page brochure. TransfeRobot has an electro-mechanical arm, many-fingered hand and electronic brain which can be taught repetitive tasks in a half hour set-up time. Robodyne, Division of U.S. Industries, Inc., Silver Spring, Md.

Use postpaid card. Circle No. 68

CUSTOM COLD HEADING

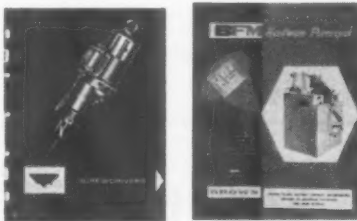
Job-designed fasteners and parts for every industry are custom cold headed. Typical rivets, threaded parts, nails, double headed parts and secondary operations are pictured and listed on a two-page flyer. John Hassall, Inc., Box 2290, Westbury, L.I., N.Y.

Use postpaid card. Circle No. 69

POWER SCREWDRIVERS

Portable electric screwdrivers and accessories are the topic of a six-page catalog and accompanying price sheets. Seven models are described, pictured and specified with capacities. Typical application photographs are included. Millers Falls Co., 57 Wells St., Greenfield, Mass.

Use postpaid card. Circle No. 70



PACKAGING HARDWARE

Equipment for packeting fasteners and parts is the subject of an eight-page brochure. Automatic machines feed, count, package and seal hardware of all sizes and shapes in paper and laminated packets. Machine drawings, specifications and features are included. Brown Filling Machine Co., Inc., Ann Arbor, Michigan.

Use postpaid card. Circle No. 71

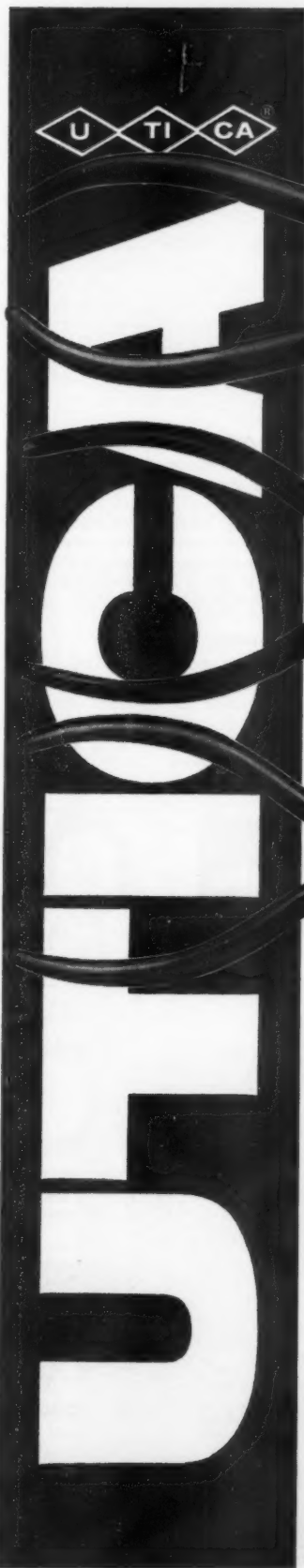
ASSEMBLY TOOL

Assembly functions of an arbor press and an impact staker are combined in the Presstaker. Six-page Bulletin CAS-1B diagrams the bench-type machine, pictures various models and tooling heads available. Staking accuracy is within .001". Cramer Controls Corp., Centerbrook, Conn.

Use postpaid card. Circle No. 72

LAMINATED SHIMS

Shims with .002" or .003" thick laminations which peel for adjustment are introduced in an eight-page bulletin. Design helps on size, shapes, wall thickness are given in drawings and text. Standard specs of shims made from brass, steel, stainless and aluminum are



ACTUAL SIZE

MIDGET TOOLS FOR MINIATURIZED WORK!

Midget tools for work on miniature assemblies are another Utica specialty. We have designed and stock the industry's broadest line of midget pliers and other special hand tools for working with ease in the most confined places. All are precision, finely finished tools. All are backed by famous full guarantee. See for yourself! Contact your Utica distributor or write for our latest hand tool catalog.

Utica Drop Forge & Tool Division,
Kelsey-Hayes Company,
Utica 4, New York.

tools the experts use!

included. User testimonials. Laminated Shim Co., Inc., 71 Union St., Glenbrook, Connecticut.

Use postpaid card. Circle No. 73

PREHEAT FOR WELDING

A method of preheat that permits quality welds on low-alloy high-tensile steels is outlined in Bulletin SH101. Details of the building block strip heater system are shown in pictures, diagrams and text. J. B. Nottingham & Co., Inc., 441 Lexington Ave., New York 17, New York.

Use postpaid card. Circle No. 74



AIR CYLINDER

The increased range of interchangeable head air and hydraulic cylinders is announced in 16-page Bulletin SQ-3-60. Technical information on bore sizes, rod dimensions, allowable strokes supersedes the previous bulletin. Illustrated. The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Mich.

Use postpaid card. Circle No. 75

STUD WELDING

A description of how stud welding works, photos of typical applications and technical data on materials, torque, tension, shear of various studs is included in a four-page mailing piece. Installation equipment ranges from single gun to fully automatic welders. Omark Industries, Inc., 9701 S.E. McLoughlin Blvd., Portland 22, Ore.

Use postpaid card. Circle No. 76

BRAZING TORCH

A battery ignited automatic air-acetylene brazing torch with a built-in self-lighting electro ignition system is presented in a four-page brochure. Features of the tool, tips on use are given. Prest-O-Matic Co., Inc., Box 531, Costa Mesa, Calif.

Use postpaid card. Circle No. 77

NYLON GROMMET

Design information for using a one-piece nylon grommet is given in a four-page data sheet. Characteristics, strength test results, installation instructions and specifications are offered. Illustrated. Western Sky Industries, 21301 Cloud Way., Hayward, Calif.

Use postpaid card. Circle No. 78

AIR POWER TOOLS

Reversible and non-reversible air screwdrivers and nutsetters are pictured, described and specified in a six-page folder. The portable tools are made in pistol and straight types with ad-

justable clutches. Bits and holders are displayed. Airetool Mfg. Co., 328 S. Center St., Springfield, Ohio.

Use postpaid card. Circle No. 79

ASSEMBLY CLAMPS

A complete line of toggle action clamps is introduced in 20-page Catalog A-60. Recommended uses and specifications are given for each of 20 horizontal clamps; 9 vertical clamps; push-pull; portable, miniature, latch type, air operated and other special clamps. Illustrated. Case-Maul Mfg. Co., Inc., 22 Harker St., Mansfield, Ohio.

Use postpaid card. Circle No. 80



COLD HEADING WIRE

What type of wire to use for especially tough cold heading jobs is charted in a four-page data sheet. Other characteristics of XL heading wire, as well as spring wire, are described. An engineering service is offered. Keystone Steel & Wire Co., 1000 Industrialist St., Peoria 7, Ill.

Use postpaid card. Circle No. 81

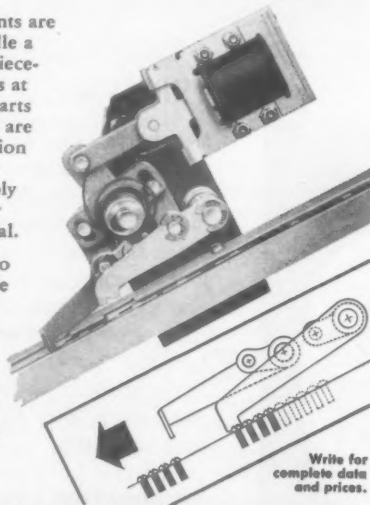
Efficient Parts Control with DIXON Escapements

HANDLE PARTS UP TO 3" SIZE

For Solenoid...Air...or Mechanical Operation

Dixon Escapements are designed to handle a broad range of piece-part requirements at rates up to 200 parts per minute. They are ideal for application to screwdrivers and other assembly equipment, either standard or special.

You won't need to experiment. These standard units save engineering and construction time and have the important advantage of replacement parts being available from stock.



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EQUIPMENT FOR AUTOMATIC PARTS HANDLING AND ASSEMBLY

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<p>CONDUIT LOCKNUTS — Up to 6"</p>	<p>SPRING-NUTS</p>	<p>FINISHED NUTS</p>
<p>VOLUME-CONTROL & SWITCH MOUNTING NUTS</p>	<p>STOP-NUTS</p>	<p>WING NUTS</p>
<p>MACHINE-SCREW NUTS</p>	<p>CAP NUTS</p>	<p>LOCKNUTS</p>

Available in Stainless Steel, Silicon Bronze, Brass, Aluminum and Steel

JACOBSON NUT MFG. CORP. Kenilworth, New Jersey

Use postpaid card. Circle No. 265

Assembly and Fastener Engineering

ELECTRODE SELECTOR CARD

"8 Factors to Consider in Selecting Arc Welding Electrodes"—is a pocket size card which gives application information on selecting all mild steel arc welding electrodes and explains how to identify them according to American Welding Society—American Society For Testing Metals classification. Hobart Brothers Co., Troy, Ohio.

Use postpaid card. Circle No. 82

TORQUE CONTROL TOOLS

Among a full line of portable power assembly tools is the Micro-Tork nut-runner on which torque requirement needs can be dialed. Description of available screwdrivers, nut runners, impact wrenches and multiple units is given in 12-page Catalog SP-3266. Specifications, photos, features of each model are presented. Chicago Pneumatic Tool Co., 6 E. 44th St., New York 17, N.Y.

Use postpaid card. Circle No. 83

AIRCRAFT LOCKNUT

FN 26, rated at 260,000 psi tensile strength, is specified in four-page Form 2608. Photos, charts and line drawings point up design and performance features. The 12-point nut achieves locking by a three-way displacement of the locking collar. Standard Pressed Steel Co., Box 1121, Jenkintown, Pa.

Use postpaid card. Circle No. 84

FASTENER ENGINEERING

An engineering service where assembly operations are studied in an attempt to reduce costs and improve quality is presented in an eight-page brochure. Six applications where adequate, but costly, fastening methods were replaced by more efficient methods are described and illustrated. Shakeproof, St. Charles Rd., Elgin, Ill.

Use postpaid card. Circle No. 85



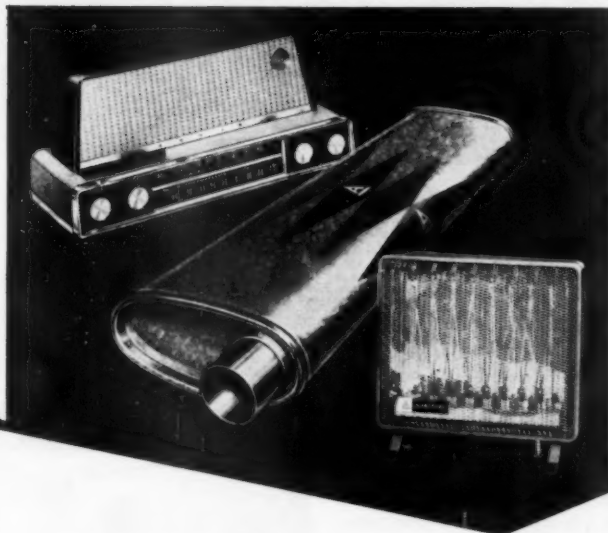
BLIND BOLTS

Advantages of blind bolts and nuts for high strength structural and repair applications are outlined in a 10-page catalog. Design characteristics, temperature and vibration test results, installation photographs and tooling are pictured and listed. Hi-Shear Rivet Tool Co., 2600 W. 247th St., Torrance, California.

Use postpaid card. Circle No. 86

ASSEMBLING SMALL PARTS

Spot-A-Mation idea describes savings of \$82,754 on one military contract in the assembling of small parts. Automatic indexing equipment and table,



at Arvin Industries, too...

FEDERAL-WARCO

High volume producers of precision metal products, Arvin Industries consistently get highest quality welds with Federal Multi-gun, automatic resistance welders.

Arvin quality control experts, like those of other leading metal fabricators across the country, know they can rely on Federal resistance welders and Warco mechanical presses to maintain quality and still meet highest production quotas. Precision-engineered to your requirement by:

THE FEDERAL MACHINE AND WELDER COMPANY
Warren, Ohio



Federal #58W268 Multi-gun resistance welder in action on Arvin muffler parts.

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PLANETARY THREAD ROLLING MACHINE CUTS COSTS

Rolls External Threads on HOLLOW WORK

Class 3 Fit

9,000 TO 20,000 PIECES PER HOUR



IF YOU ARE NOW BUYING tube nuts like these, you can cut costs by heading them yourself and roll-threading the hollow parts on a Prutton Model 300. You can buy cheaper stock (rolled wire) and make your own parts.

IF YOU ARE NOW MAKING THESE PARTS ON A SCREW MACHINE, you can get "cold forged" quality faster for less than the cost of cutting or grinding. No need to buy expensive hex-stock. And, you eliminate these screw machine operations: drilling, turning, chamfering, threading and cut-off.



PRUTTON'S PLANETARY CIRCULAR DIE accounts for the tremendous increased production. Hollow parts are hopper fed in a continuous stream to the circular die. The "lost motion" of the reciprocal type thread roller is completely eliminated.

The Prutton Model 300 is the only **high speed** machine on the market for external roll-threading of hollow work. It can roll-thread as many as 18,000 pieces per hour with a slow die speed of only 164 fpm—which means long die life.

Speeds output many times—cuts costs 50%—improves quality—saves man hours and floor space. Used by some of the biggest names in American industry.

VERSATILE: Built primarily for hollow work . . . but may also be used on solid work in a wide range of metals and sizes.

HIGHER OUTPUT AND LOWER COSTS ADD DOLLARS TO YOUR THREAD ROLLING PROFITS . . .

A Prutton can be used for thread rolling, roll forming, knurling, marking, serrating and necking of threaded hollow work, special parts, nails, bolts and screws in a wide range of sizes. Send prints and/or samples for free estimates on machine costs.

Write or Phone for Cost Savings Information, TODAY!



**Leader in Planetary
Thread Rolling**

JUST PIN THIS COUPON TO YOUR LETTERHEAD

PRUTTON CORPORATION
5295 West 130th St.
Cleveland 30, Ohio
Dept. AF

Please send information on Model 300 Thread Rolling Machine

Name Title

Company

Street Address

City Zone State

Use postpaid card. Circle No. 267

wiring diagram and sequence of operation are pictured and described on a two-page punched leaflet. The Bellows Co., 200 Bellows Bldg., Akron 9, Ohio.

Use postpaid card. Circle No. 87

SEALING PRODUCTS

Applications for industrial gaskets, oil seals, packings and washers are suggested in a 36-page, 50th Anniversary Catalog 505A. Types, properties, specifications for each product are given. A chart compares brand names with service temperatures, compressibility, resistance to No. 3 oil, fuel, water. Victor Mfg. & Gasket Co., 5750 W. Roosevelt Rd., Chicago 50, Ill.

Use postpaid card. Circle No. 88



DESIGNING FOR ASSEMBLY

Design engineering data on selecting drives, calculating load requirements, ordering index tables, transfer machines from standard components is contained in 44-page Catalog 160. Assembly presses are pictured and specified. Typical applications shown. Ferguson Machine Corp. of Indiana, 7818 Maplewood Industrial Ct., St. Louis 17, Missouri.

Use postpaid card. Circle No. 89

LEVELING SCREWS

Examples of how leveling screws are used in actual applications are pictured in six-page Bulletin 602. Three types of levelers—cushioned, broad-based and economy—are specified in stock sizes. The Ohio Nut and Bolt Co., 33 First Ave., Berea, Ohio.

Use postpaid card. Circle No. 90



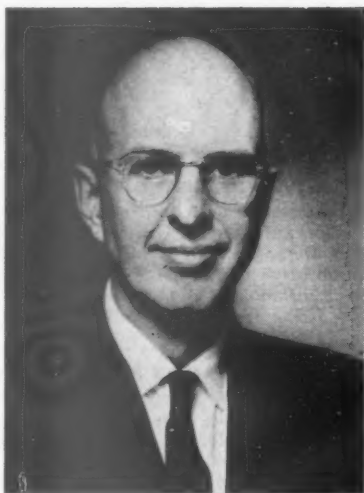
TOOL DEVICES

Standardized tool devices for fixtures, jigs and dies are attractively presented in an eight-page catalogue. Toggle pads; spring plungers; torque swivel and toggle screws; ball nose spring plungers are pictured, specified and dimensionally drawn. Specific features are listed. Siewek Tool Co., 2862 E. Grand Blvd., Detroit 2, Michigan.

Use postpaid card. Circle No. 91

Assembly and Fastener Engineering

INDUSTRY MAKES NEWS



R. D. Thomas, Sr., chairman of the board of Arcos Corp. is the new president of the American Welding Society.



The new Technical Service Laboratory built by Union Carbide Chemicals Company near Tarrytown, N.Y., houses 46 individual laboratory units, as well as offices and supporting facilities.

UNION CARBIDE OPENS TECHNICAL LAB

Union Carbide Chemicals Co. is now operating its new Technical Service Laboratory in Tarrytown, N.J. The new facility centralizes the customer service and use-research that since 1925 had been carried out principally at Mellon Institute in Pittsburgh.

The laboratory building contains 46 laboratories with 33 adjacent offices for about 100 scientists. A supporting staff of 50 is directed by Dr. A. B. Steele. The three-story stainless steel and glass building is 300 ft. long and 60 ft. wide.

A Mechanical Test Building connected to the laboratory contains a two-story test area overlooked by a mezzanine office area.

REVISE INDUSTRIAL FASTENERS INDEX

The period 1956-58 has been chosen as the base years for the revised Industrial Fasteners Index. It was felt that these years were more nearly normal than the period 1947-49. The index continues to reflect the level of dollar volume of shipments of a representative group of companies.

In April 1960 the unadjusted figure was 95, seasonally adjusted, 92. This compares with 102, 111, 103 in the first months of 1960 and 99, 105, 105, 119 in the first four months of 1959, all adjusted figures.

AWS ELECTS R. D. THOMAS PRESIDENT

R. D. Thomas, Sr., chairman of the board of Arcos Corporation, was elected new president of the American Welding Society at its 41st Annual Meeting in Los Angeles, Calif.

Associated with the welding industry for more than 40 years, Thomas is a charter member of the Society of its first section in Philadelphia. He has served as chairman of the Philadelphia Section, member of the board of directors and as AWS representative to the International Institute of Welding.

The Past President's Certificate was awarded to C. I. MacGuffie, whose term of office expired May 31. He is manager of special products, Air Reduction Sales Corp.

Adams Lecturer for the year was Dr. Robert D. Stout, head of the department of metallurgy, Lehigh University. His paper was "Higher Strength Steels in Welded Structures."

continued

ONLY 5 STATIONS REQUIRED TO PRODUCE THESE COLD-FORMED



*Intake
Valves*

at a rate of 80 PER MINUTE from
1/2" diameter wire ...



ON THIS PELTZER & EHLERS
PROGRESSIVE HEADER

A leading valve manufacturer, in the U.S.A., will soon realize these benefits. This is another of the many examples that profitably demonstrates cold forming difficult parts IS NOT DIFFICULT ON THE VERSATILE PELTZER & EHLERS PROGRESSIVE HEADER. In this case only 5 steps do the job:

1. CUTTING-OFF
2. EXTRUDED
3. HEAD AND EXTRUDE
4. FINISH HEAD
5. TRIM

Your Intake Valves and many other USUALLY DIFFICULT AND COSTLY TO MAKE parts can be produced faster and better, with important cost savings. Let internationally experienced Boltmaster engineers show you how. Write or phone ED 1-4858 for details!

Sold and Serviced in U.S.A. and Canada by

The BOLTMASTER Co.

Exclusive importers of Peltzer & Ehlers, Krefeld, Germany,
builders of machinery for the bolt industry since 1888.
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More than 140 companies participated in the annual Welding Show with 9033 registered visitors. Attendance at the meeting was 923.

EXHIBITORS FLOCK TO 1961 DESIGN SHOW

A registration of 22,500 visitors at the Design Engineering Show held at the New York Coliseum, May 23-26, set an all-time record for the exposition. The previous high of 17,400, established the last time the show was held in New York, in 1957, was exceeded on the third day when the total was 17,800.

In an unprecedented action, exhibitors at the show met at the Coliseum on the third day and contracted for 95% of the available space for the 1961 show. When the remaining space is scheduled, the 1961 show will be about one-sixth larger than the New York event. It will be held at Cobo Hall, Detroit, May 22-25.

SALES PROMOTIONS AT GREGORY IND.

Robert C. Friedly has been named general sales manager for products for Gregory Industries, Inc., Lorain, Ohio. He joined the Nelson Stud Welding organization in 1946 and was named product sales manager in 1958.

Three product sales managers have also been announced: Paul H. Butterfield, construction; George T. Kramer, industrial sales; Alex M. Oleair, steel mills and transportation industries.



HANNELL ADVANCES IN G.E. ENGINEERING

Frank D. Hannell has been appointed manager of product production engineering for the General Electric Communication Products Department at Lynchburg, Va. The position includes liaison between manufacturing and engineering sections in the translation of product into finished goods. He is a member of the Institute of Radio Engineers.

FEDERAL MACHINE ADDS N.Y. AREA REP.

Harrington-Wilson-Daum Corp., Mount Vernon, N.Y. announces that their firm has been appointed sales and service representatives for The Federal Machine and Welder Company. The newly-appointed representatives cover the northern New Jersey, metropolitan New York and Long Island area.

ENGINEER JOINS DETROIT STAMPING



Alexander W. McPherson has joined Detroit Stamping Co., Detroit, as product development engineer. He will institute an expanded program to enlarge and improve on the company's line of products.

McPherson began his industrial career as a die maker. Before leaving to start an experimental sheet metal business, he was a process engineer for Burroughs Corp.

PRODUCTION ENGINEERING SHOW GROWS

The Production Engineering Show, held every five years to coincide with the Machine Tool Show, will have about 50% more exhibitors (300) and occupy about 100% more exhibit space than it did in 1955, it was reported by Clapp & Poliak, Inc., New York.

Both shows will be held in Chicago from September 6 through 16. Exhibit space at the Machine Tool Show, which will be held at the International Amphitheatre, is restricted to association members producing machine tools. Exhibits at the Production Engineering Show, to be held at Navy Pier, are open to exhibitors whose products support prime production tools. Mechanisms, instruments and equipment that contribute to greater efficiency will be shown.

PARKER-KALON WINS PACKAGING AWARD

For their contribution of a new idea in the packaging of fasteners, Parker-Kalon, a division of General American Transportation Corp., Clifton, N.J., was singled out for a merit award by the Folding Paper Box Association of America.



Selected at the annual Folding Carton Competition as "an outstanding example of progressive packaging," the new package, called Grand-Pak, was designed by the Packaging Committee of Parker-Kalon, with art direction by Gerard Cafone in conjunction with Federal Carton Corporation of North Bergen, N.J., who produced the entire line of cartons.

CAMLOC REPORTS QUARTERLY EARNINGS

Camloc Fastener Corporation reports preliminary net income of \$58,589 for the three months ended March 31, 1960. This is equal to 17 cents per share on the 350,500 common shares.

The showing compares with the net income of \$70,033—20 cents per share on the present number of shares—earned in the initial quarter of 1959.

Net earnings for the opening quarter of 1960 amounted to 6.1% of gross sales of \$953,590, compared with the 6.3% of the gross sales of \$1,110,123 which was brought down to net income in the March quarter of 1959.

continued



brazing

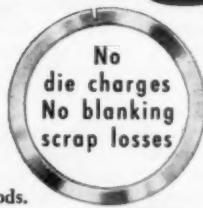
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Edgewound

FROM WIRE STOCK

- No lead time needed for dies or exact strip.
- Use with induction, gas-air, furnace, or other heating methods.
- Available in EASY FLO and SILFOS — Copper, Bronze, and other alloys.
- Diameters up to 4" I.D., wire thicknesses from .010 upward.

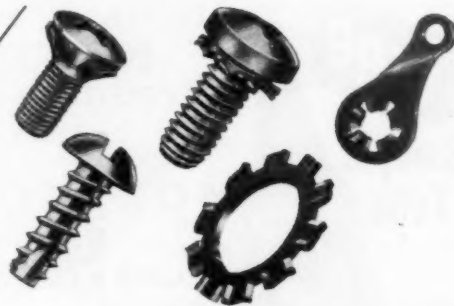
Write for 16 page booklet on better brazing.



LUCAS-MILHAUPT Engineering Co.

5060 South Lake Drive, Cudahy, Wisconsin

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Together

matters with industrial fasteners, too!



Everlock
INDUSTRIAL FASTENERS

Thompson-Bremer & Co.
Division of
American Machine
& Foundry Company

Together, industrial style, has a special meaning at Thompson-Bremer because we are one of the few fully integrated manufacturers of Sems, lock washers, thread-cutting screws, terminals and cold-headed specialties. With our engineering services and components manufacturing together under one roof, we can give you faster, more individualized service at competitive prices. We'll bid on your specials requirements, or fill orders for standard items on short notice from the extensive line of EVERLOCK products stocked by your local distributor.

If you buy or specify industrial fasteners, you want whatever your company assembles to go together economically and stay together reliably. Send for catalog and samples or call your EVERLOCK representative.

Thompson-Bremer & Co., Dept. 24
228 N. LaSalle St., Chicago 1, Ill.

Please send me:

EVERLOCK fastener catalogs _____ samples of
EVERLOCK industrial fasteners and cold-headed specialties.

Name _____ Title _____

Company _____

Street _____

City _____ Zone _____ State _____

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Quarterly income figures, per se, are not indicative of full year possible earnings due to temporary lag and/or to change in timing or other provisions of defense contracts.

CURTISS-WRIGHT ACQUIRES SWENCH WRENCH

Curtiss-Wright Corporation has announced the acquisition of manufacturing and sales rights for the Swench manually-operated impact wrench from Swenson Engineering, Branford, Conn.

William MacEwen, general manager of the Marquette Division, Curtiss-Wright Corporation, said that production of three models of the maintenance tool will start immediately at the division's Cleveland plant. A nationwide sales organization of distributors is being set up for marketing the new products starting in July.

MCLAUGHLIN ELECTS TOP EXECUTIVES

Robert B. Ryan has been elected president and Robert D. Martin, vice president, of The McLaughlin Co., Birmingham, Mich., by the Board of Directors.

Ryan moved up to the top-executive post after 10 years with the company, most recently as vice president. Martin has been with the company for eight years.



MARTIN



RYAN

ELECT CHANNER TO FASTENER INSTITUTE

Earle A. Channer, vice president-sales of The H. M. Harper Company, Morton Grove, Ill., has been elected to a three-year term on the executive committee of The Industrial Fastener Institute, Cleveland, Ohio. The Industrial Fastener Institute membership is composed of the major U. S. producers of bolts, nuts and rivets.

NEW WIRE DRAWING PLANT IN ELIZABETH, N.J.



Great Eastern Wire Corporation announces the opening of their new 20,000 sq. ft wire drawing mill in Elizabeth, N.J., which houses a complete wire processing operation from rod cleaning to wire drawing.

Size range starts at .005" and rounds out to .375" with mill capacity at 1200 tons per month. A technical research department is available to wire users. Great Eastern Wire Corp., is a member of the Wire Association.

WELDING SOCIETY TO MEET IN PITTSBURGH

The American Welding Society Fall Meeting will be held in the Penn-Sheraton Hotel, Pittsburgh, Pa., September 26 through 29, 1960. Seventeen sessions will be held and a total of 51 technical papers presented.

NYLOK ELECTS THREE VICE PRESIDENTS

Three vice presidents have been elected by The Nylok Corp., Paramus, N.J. They are Bryan Steele, El Segundo, Calif., western operations; James H. Trebilcock, Skokie, Ill., midwest operations; John W. Brightman, Paramus, N.J., manufacturing.

LONG-LOK ADDS SALES REPRESENTATIVE

Ward M. Doland of the Doland Co., Bellevue, Wash., has been named representative for the Long-Lok Corporation, Santa Monica, Calif. Doland will represent the company in Washington and Oregon.

Free
Sample
Tube



**Industry's
NEWEST
Production
TOOL**

**MOLYKOTE®
G
LUBRICANT**

- ALMOST 100% SAFETY AGAINST GALLING AND SEIZING WITH ALL BEARING METAL COMBINATIONS
- ELIMINATES STICK-SLIP, METAL PICK-UP AND DISTORTION IN PRESS FITTING
- REDUCES WEAR-IN TIME AND DAMAGE IN NEW OR REBUILT MACHINERY
- THE HIGHER THE LOADS, THE GREATER THE MARGIN OF SUPERIORITY OF MOLYKOTE G

Write for your free sample of MOLYKOTE G LUBRICANT today. We will also send you a copy of our new Bulletin 126 which gives complete details. THE ALPHA-MOLYKOTE CORPORATION, 65 Harvard Avenue, Stamford, Conn. Phone TRiads 8-3724. Plants in Stamford, Conn., Munich, Germany and Strasbourg, France.

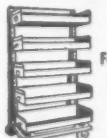
THE ALPHA-MOLYKOTE CORP.
65 Harvard Ave., Stamford, Conn.
Please send me a free sample of your MOLYKOTE G Lubricant.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____


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THE VER-T-RACK

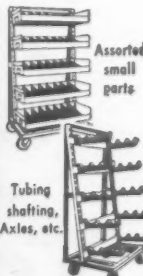
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For small parts



HEIGHT—65½" LENGTH—35"
WIDTH—24". CAPACITY 2000 lbs.



Assorted small parts
Tubing, shafting, Axles, etc.

- ELIMINATES MATERIAL DAMAGE
- REDUCES WORKER FATIGUE
- MAXIMUM EFFICIENCY AT MINIMUM COST

- EXPEDITES MATERIALS UP TO 60% FASTER
- SAVES MAN HOURS
- SAVES FLOOR SPACE
- GREATER SAFETY FACTOR

Equipped with 6" roller bearing steel wheel casters

VER-T-RACK can be handled with lift truck.

Trays are adjustable on **VER-T-RACK**

PRICE — \$49.50 Varied Accessories Extra

Slightly higher west of the Rockies Write today for descriptive literature



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Assembly and Fastener Engineering

PURCHASING STAFF CHANGES AT CHRYSLER

William C. Cawthon has been named director—corporate purchasing staff, with responsibility for all corporate purchasing activities at Chrysler Corporation. E. Lloyd, who has been director of purchasing administration, was appointed executive assistant to B. W. Bogen, vice president.

Cawthon joined Chrysler in 1947 and was plant manager at Hamtramck at the age of 35.

Other promotions were: John D. Moran, director of purchasing administration services, Richard D. Morrison, purchasing agent for materials and services purchasing.

REICHOLD SALES UP 6 PERCENT

Reichhold Chemicals, Inc., White Plains, N.Y., reported record sales of \$23,770,000 for the first three months of 1960, an increase of 6% over the same period in 1959.

Net income for the first quarter of 1960 amounted to \$663,000 compared with \$703,000 for the same period last year.

NEW ITW POWER TOOLS REP.

Curt Carr of the Curt Carr Company, Inc. of Los Angeles, has been appointed sales representative for the Power Tools Division, Illinois Tool Works in the states of California and Arizona.

DUDEK & BOCK CONSOLIDATE SUBSIDIARY



DUDEK



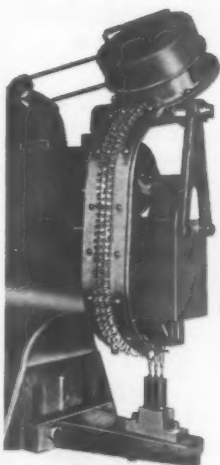
BOCK

Climaxing 14 years of growth, Dudek & Bock Spring Mfg. Corp., Chicago, has consolidated its wholly-owned subsidiary, Advance Spring Corp., into the parent organization. All facilities and personnel have been moved to a new 30,000 sq. ft. building ad-

joining the present new Dudek & Bock plant. Total plant space is 72,000 sq. ft. and employees 300.

continued

Fastening Costs Too High?



**SET
MULTIPLE
EYELETS
AUTOMATICALLY**

ON MACHINES BY

**Edward
Segal**

You can do many fastening operations faster and more economically on Edward Segal Automatic Eyeletting Machines. Faster because a number of eyelets can be set simultaneously and rapidly. More economically because of the low cost of eyelets. And Segal machines are designed to give dependable, neat fastenings every time.

Let us study your fastening problem. We can supply equipment with just the right tooling and degree of automation for your operation. Write for details to section AFE-7.

EDWARD SEGAL • 132 LAFAYETTE STREET, NEW YORK 13, N.Y.
MFRS. OF EYELETING MACHINERY, SPECIAL HOPPERS & FEEDING DEVICES

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July, 1960

eliminate safety wire

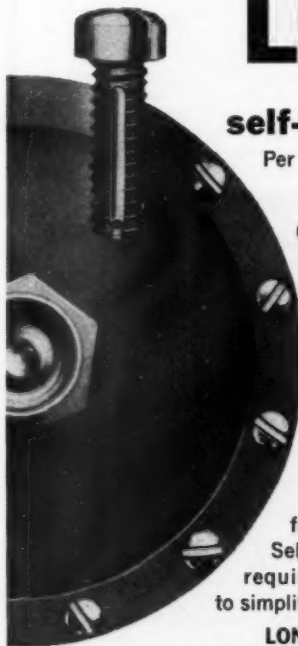


on airborne accessories
with...

LONG- LOK

self-locking screws

Per MIL-F-18240



Critical weights and need-less and costly man-hours of assembly time are being saved through the use of **LONG-LOK Self-Locking Screws** on pressure switches, motors, pumps, valves and other airborne accessories.

Many companies in the aircraft, missile and rocket fields are using **LONG-LOK Self-Locking Screws** per the requirements of MIL-F-18240 to simplify their assemblies.

LONG-LOK Self-Locking Screws are heat, vibration, shock and impact resistant. They are reuseable and can be head marked for self-lock identification per specification. Increased reliability of component and system is assured.

LONG-LOK Self-Locking Screws are solving new fastener problems every day. They could be the answer to your needs.

Write for Catalog LL-60



LONG-LOK

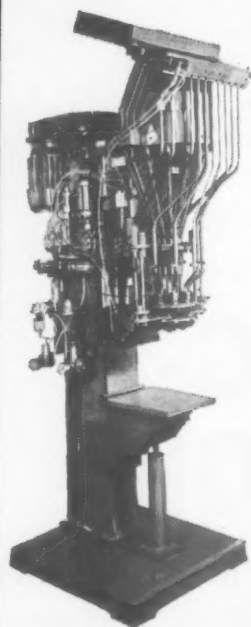
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**this machine will
drive up to
10 screws at
one time . . .**

... reducing assembly costs and improving quality. Built for high production jobs where a fixed set up is practical, this multiple spindle screw driving machine automatically feeds screws from a hopper and drives them to a predetermined torque. Evenly distributed pressure eliminates stresses caused by driving home one screw at a time. A simple sliding fixture positions work pieces accurately.

Machine illustrated shows application of multiple spindle screwdriving to assembly of electric power drills.

Send a sample of your assembly and a list of your requirements. We will be happy to show you how multiple spindle screw driving can be applied to your job.

COOK & CHICK COMPANY
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SPECIAL RIVETS
like some of the samples shown here . . . or the more commonly used tubular and split rivets . . . they're all alike to the American Rivet Co. And always—our own special brand of quality and service that gets you what you want when you want it.

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President Joseph Dudek reports that the combined gross sales of the two companies in the past fiscal year was \$5 million. Secretary and sales manager Stanley Bock looks for a sales potential of \$6 million, as a result of the consolidation to one location.

WALDES FILLS TWO NEW SALES POSITIONS

Two new positions in the sales organization of the Truarc Retaining Rings Division of Waldes Kohinoor, Inc., Long Island City, N.Y., have been filled. Paul E. Wolfe has been named eastern division manager and Mrs. Hedy Zawistoski, manager of distributor and customer services.



ZAWISTOSKI



WOLFE

ALLIS-CHALMERS ADVANCES ENGINEERS

Three new appointments to its West Allis Works Industries Group have been announced by Allis-Chalmers, Milwaukee; A. D. Foote, manager of materials; R. L. Carlstein, manager of manufacturing, and M. W. Schaefer, assistant manager of materials.

RECORD SALES FOR H. M. HARPER CO.

The H. M. Harper Company reported record sales for the first three months ended March 31, 1960. According to H. M. Harper, president, consolidated net sales of the company for the first quarter totalled \$3,272,038, the highest in the company's 37-year history for a like period. Last year's first quarter sales amounted to \$2,578,445.

Net income after taxes for the company totalled \$204,376, as compared with \$202,623 for the same period a year ago.

Earnings were equivalent to 40 cents per share on the 486,460 shares of common stock outstanding on March 31, 1960, against 39 cents for the same number of shares last year.

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OLIN MATHIESON PROMOTES ENGINEERS

Promotion of Edward W. Ruhe to the newly-created position of chief engineer of the engineering and maintenance department of Olin Mathieson Chemical Corporation's Metals Division plant at East Alton, Ill., has been announced by George A. Chandler, plant manager.



KUNZ



RUHE

He will be succeeded as Roll-Bond manager by Charles O. Kunz, who has been sales engineer for the St. Louis territory.

HUBBELL ADDS SOUTHERN REPRESENTATIVES

The Machine Screw Department of Harvey Hubbell, Inc., Bridgeport, Conn., announces the appointment of two new sales representatives. Earl W. Brotherton of Pompano Beach, will cover Florida, and the G. E. Richter Sales Agency, Chattanooga, will be the representative for Tennessee, Alabama, Georgia and part of Mississippi.

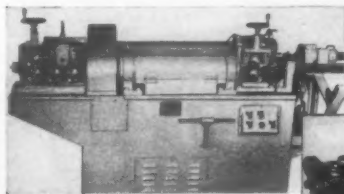
WELDING SOCIETY PRESENTS AWARDS

Twelve outstanding leaders in the field of welding were honored at the opening ceremony of the 41st Annual Meeting of the American Welding Society, held in Los Angeles.

District Meritorious Certificate Awards were presented to: S. Low, Chapman Valve Mfg. Co.; E. W. Moles, Grumman Aircraft Engineering Corp.; R. K. Lee, Alloy Rods Co.; W. Begerow, Aircro Equipment Mfg. Co. of Air Reduction Co., Inc.; G. O. Hoglund, Aluminum Company of America; H. E. Miller, Carrier Corp.; J. C. Thompson, Jr., Union Carbide Nuclear Corp.; P. J. Rieppel, Battelle Memorial Institute; W. G. Morgan, Arvin Industries, Inc.; R. H. Hoeffer, Kaighin and Hughes, Inc.; W. M. Norton, Caterpillar Tractor Co.; and F. G. Singleton, Singleton Welding Supply.

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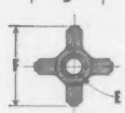
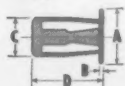
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4-L, JN	15/32	3/64	9/32	3/4	6-32	43/64
* 6-S, JN	17/32	1/16	3/8	11/16	10-24	25/32
** 6-S, JN	5/8	1/16	27/64	3/4	1/4"-20	13/16

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* 8-32 & 10-32 threads available

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NOTE: 4-S, JN & 6-S, JN also available in brass

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Meritorious Certificate Awards, established by the American Welding Society, are given as a means of recognizing those who have performed some definite or unusual service to a section, a district or to the Society, or for some outstanding achievement in the science or art of welding.

UNITEK NAMES SALES PROMOTION EXECS.

Othmar W. Sailer has been named director of marketing and Donald A. Drake, advertising sales promotion manager, for Unitek Corp., Monrovia, Calif., which includes the Weldmatic Division.

Formerly product planning manager for Wiancko Engineering Co., Pasadena, Sailer has an electric engineering degree from the University of California. Drake has been with the company for a year as technical and sales promotion writer after coming from Cannon Electric Co., Los Angeles. He will operate within the Corporate Marketing Group, recently created by E. L. Mayox, president, and Frank W. Johnson, vice president.



SAILER

PHEOLL ADDS TO ADVERTISING STAFF



Don Paul McCauley has been appointed assistant advertising manager of Pheoll Mfg. Co., Inc., Chicago. McCauley was formerly associated with the sales organization of Remington Rand, Inc. In prior connections he was production editor for The World Book Encyclopedia; production editor of Building Construction Illustrated; and broadcasting service man for the TV and radio department of Leo Burnett Co.

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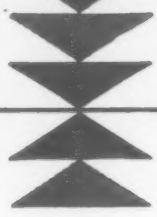
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ONE LAST WORD

IS OURS A NATION OF MEDIOCRITY?



Is this the work of second-rate engineers, scientists, designers and builders? The effort of mediocre incompetents?

These are the material—but what of the spiritual? Never before in the history of mankind has a nation given away so much of its wealth to others. To our families, our friends and neighbors we are a nation of sharers, not misers. Our values in home, family, justice, liberty and freedom run deep. These spiritual values are no more mediocre than our material accomplishments. And there is this to be said for material things: you can have no deep, abiding spiritual values on an empty stomach, cowering cold in the corner of a hut, with the rack and scaffold within sight, and with pain, poverty and grueling labor constant companions. One might ask: in what age, in which nation, have existed any deeper spiritual values so that we might compare?

These are reassuring answers to the charge of mediocrity and many of us will sleep more soundly. But, honestly, just between you and me, and not for publication, is the mediocrity charge really ill-founded? With all of our facilities and opportunities are we doing the best we can?

No nation has spent more for an educational system which is devoted to training conformists. Educational programs are based on developing averages, and do you know what an average is? The best of the worst or the worst of the best. We are preparing

students, not for a superior life, but for a life of status quo.

Professionally, we are not as competent as we could be. We try to pass, and live by a code of "good enough". We do not study and continue to improve; we do not fight for better performance and for higher standards. With so many opportunities we still merely shuffle through the day so that we may shuffle home and squat like turnips before a lighted piece of glass watching other turnips groan and shake.

Morally, we should be superior beings. The wisdom of the ages is at our finger tips. The belly is full, the shelter is warm, the material wants are satisfied and our moral code should be above reproach. Instead, we live in the age of the fast buck, the goof-off, the crooks and the racketeers, and the devil take the hindmost. While this sort of thing has always been with us, and our moral standards are probably no lower than they were 100 years ago, the point remains—with what we have to work, they should be at a much higher level.

After all is said, some of our accomplishments are of mighty stature and we should take pride in them, but lest we become complacent each of us has it within him—or available to him—to be twice the person he now is. And if there is one deadly sin above all the others, it is this: that a man does not do the very best with what he has, that he deny his destiny and aspire to no greater heights than mediocrity.

Wm. F. Schleicher

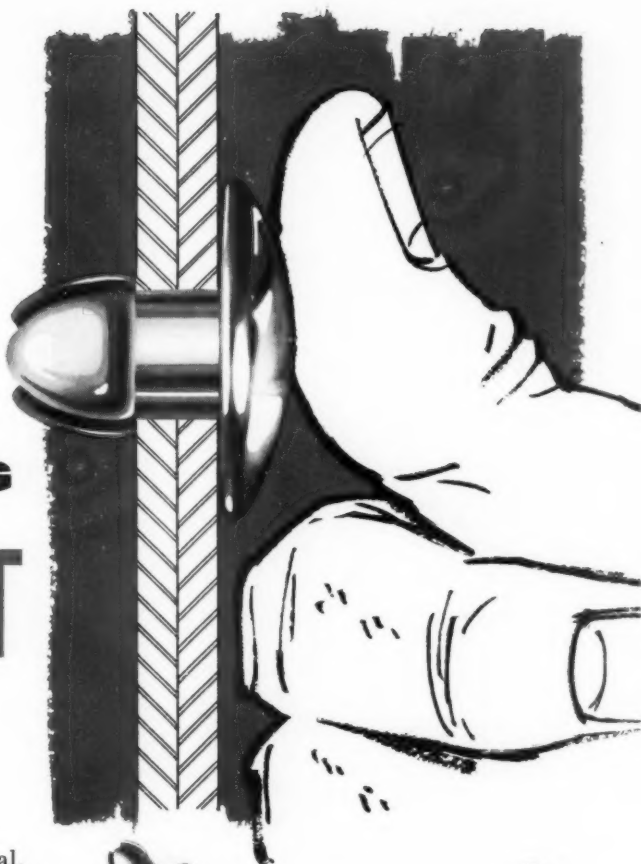
Vice President & Editorial Director

Our nation has been dubbed by some as the nation of mediocrity. How mediocre our architecture? What of our sciences—chemistry, physics, astronomy, mathematics? Of navigation, celestial and otherwise? What of the mechanical world? What of our medicine? What of religion, where the voices ring out loud and clear?

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